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PRODUCER GOODS, CONSUMER GOODS AND ACCELERATION OF GROWTH[1]

THE literature on industrialisation and development contains fairly frequent reference to a group of industries variously called investment, producers, heavy or basic goods industries. It is widely believed that these industries play a crucial role in economic progress. They "make machines to make machines."[2] They are thought to be "self-accelerating after a certain point."[3] They "lead to and sustain high rates of industrial growth."[4] In the Soviet bloc countries they are singled out for special emphasis and enjoy preferential treatment in resource allocation. In consequence, they tend to grow more rapidly than other industries. A similar emphasis is to be found in some underdeveloped countries where the build-up of productive capacity in areas such as steel and non-ferrous metals, metal working and power generation is regarded as a priority need.

Western economists seem generally to share the view that producer or investment-goods industries are of special significance for the growth process. They do not, however, recommend these industries for preferential treatment in their own countries, primarily because of acceptance of the market mechanism for resource allocation, and perhaps also because of a belief that such treatment is not needed in the later stages of industrialisation.

Favoured treatment for the investment-goods industries involves the question not only of the volume or rate of investment but also that of its allocation. What are the consequences, for both sector and overall growth and for the rates of saving and investment, of some given allocation of investment, or change in the allocation of investment, between the consumption and investment-goods sectors?

It is the purpose of the present paper to examine the mechanism by

[1] I have received helpful suggestions from many persons in the course of developing this paper. I am especially indebted to V. Lewis Bassie and Hans Brems for reading and criticising the manuscript and to Donald Shuford for statistical assistance.

[2] United Nations, *Economic Survey of Asia and the Far East*, 1957, Pt. II, p. 87.

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which the investment-goods industries affect growth. To this end, a two-sector growth model is presented which integrates and sets forth the relations between the capital stocks and their respective outputs in the investment and consumption sectors. The model also provides a basis for developing the relations among the allocation of investment, savings and growth and for computing the time paths of the capital stocks and outputs in a hypothetical underindustrialised economy that seeks to move from a low rate of growth to a higher target rate. An effort is made to relate the findings to Soviet development experience, and some alternative interpretations of that experience are suggested. The possibility of a reversal of emphasis by the Soviets, away from investment and toward consumption, also is briefly discussed.

Structure of Capital and Relation to Growth[1]

Visualise an economy whose capital stock consists of two parts, each specialised in function. One part produces only consumption goods, while the other produces only investment goods, *i.e.*, additions to the capital stock.[2] Investment-goods output adds, of course, to each type of stock, and its division between them determines their respective rates of growth. Neglecting other productive factors, growth in each type of stock determines in turn growth in capacity to produce each of the corresponding types of output. Thus, the allocation of investment-goods output determines the growth of both consumption and investment-goods output. Assuming that the economy moves along a full-capacity growth path, with *ex ante* savings and investment equal, it follows that relationships exist between the savings ratio, on the one hand, and, on the other, the relative sizes of the two stocks and the division of investment-goods output between them.

The relevant variables and relations are made explicit in the following model, which differs from the familiar Harrod–Domar type of model in that both capital stock and output are disaggregated in the manner already indicated.

[1] The model to be described has much in common with those of E. Domar, *Essays in the Theory of Economic Growth* (1957), Chapter 8, and P. C. Mahalanobis, "The Approach of Operational Research to Planning in India," *Sankhya*, 1955, Vol. 16, p. 3. However, in terms of development and emphasis, it differs from both in important respects. See also Mahalanobis, "Some Observations on the Processes of Growth of National Income," *ibid.*, 1953, Vol. 12, p. 307.

[2] Though in casual usage the terms investment goods, producer goods, basic and heavy goods (industries) often are used interchangeably, it is necessary here to distinguish them from one another. Investment goods, the only one of the four terms that has a place in this discussion, serve to replace and augment the capital stock. Producer goods is a broader category that includes not only investment goods but all intermediate goods used by enterprises. Writers using the term basic goods appear to have in mind certain major intermediate goods essential in industrial production—steel, non-ferrous metals, perhaps machinery, coal, petroleum, etc.—while the term heavy goods commonly relates to the output of capital-intensive industries. Obviously there is considerable overlap among the categories. Military goods belong in the consumption category, because they do not share the characteristic of investment goods of increasing productive capacity.

Variables:

C = annual output of consumption goods in constant prices;
R = annual capital replacement requirements in constant prices;
S' = capital stock in the investment-goods industries in constant prices;
S'' = capital stock in the consumption-goods industries in constant prices;
Y = annual gross national product (G.N.P.) in constant prices;
i = the growth rate in per cent per year.

Parameters:

α = average propensity to consume out of G.N.P. It is a constant only under constant proportionate growth;
β' = capital coefficient in the investment goods industries;
β'' = capital coefficient in the consumption goods industries;
β = overall capital coefficient;
γ = marginal propensity to consume out of increments to G.N.P.—it is equal to α only under constant proportionate growth;
δ = target (average) propensity to consume out of G.N.P.;
n = useful life of capital goods in years;
w = fraction of net investment allocated to the investment-goods industries.

The subscript t indicates the period to which a variable refers. Where the variable is a stock, reference is to the end of period t.

Basic relations:

(1) $$C_t = \alpha_t Y_t$$

which expresses consumption as a function of output. It will be a linear function as long as α is constant.

(2) $$S'_{t-1} = \beta' Y_t (1 - \alpha_t)$$

(2a) $$S''_{t-1} = \beta'' \alpha_t Y_t$$

These equations state the dependency of each type of output on its capital stock. Thus, gross investment is fixed by the size of the stock in the investment-goods sector and the capital coefficient in that sector, while the output of consumption goods depends on the amount of stock in the consumption-goods sector and the corresponding capital coefficient. If the capital coefficients are defined as full-capacity coefficients, then (2) and (2a) specify requirements for full-capacity output.

(3) $$R_t = Y_{t-n} (1 - \alpha_{t-n})$$

which says that replacement equals gross investment n years ago, the assumption being that capital goods are fully productive until their terminal

year. Depreciation, as distinct from replacement requirements, is neglected.

$$Y_t = C_t + \Delta S'_t + \Delta S''_t + R_t \tag{4}$$

That is, G.N.P. is the sum of consumption, net investment in each of the two sectors, and replacement.

From these relations two further expressions can be derived, linking stocks and their increments to the two types of output and/or to savings.

$$\frac{S'_{t-1}}{S''_{t-1}} = \frac{\beta'(1-\alpha_t)}{\beta''\alpha_t} \tag{5}$$

$$\frac{\Delta S'_{t-1}}{\Delta S''_{t-1}} = \frac{\beta'(1-\gamma_t)}{\beta''\gamma_t} \tag{6}$$

Equation (5) is that ratio of (2) to (2a). The derivation of (6) is shown in the appendix. Equation (5) states in effect that the structure of the capital stock is uniquely related to the structure of output or, in this case the same thing, to the savings–consumption ratio. That a relationship of this sort should exist is fairly obvious, in view of the specialisation of stocks to consumption and investment-goods output and the equality, both *ex post* and under full-capacity growth, between investment and saving. Equation (6) expresses the correlative marginal relationship: the structure of additions to stocks is uniquely related to the structure of additions to output or, the the same thing, to the *marginal* savings–consumption ratio. In slightly different words (6) describes the relationship between the division of net investment between the two sectors, on the one hand, and the gross marginal propensity to save, on the other. Rewriting (6),

$$w = \frac{\Delta S'_{t-1}}{\Delta S'_{t-1} + \Delta S''_{t-1}} = \frac{\beta'(1-\gamma_t)}{\beta'(1-\gamma_t) + \beta''\gamma_t} \tag{7}$$

Thus, w represents the share of net investment that is allocated to the investment-goods sector. A decision by (say) a planning authority with respect to investment allocation implies also a decision about the marginal gross savings ratio. Conversely, a decision about the fraction of increments to output that will be saved implies a correlative decision about how investment-goods output shall be allocated between the investment and consumption sectors.

Investment Allocation, Saving and Constant Growth

In this model, as in a simple Keynesian model, equilibrium at full-capacity output requires an equality between full-employment savings and investment. To maintain this equality over time, it is also necessary, as in a one stock-growth model, that investment and savings grow at some appropriate rate, since each period's investment adds to productive capacity. But unlike the one stock-growth model, it is further necessary that certain structural conditions, expressed by (5) and (6), be satisfied. If, for example, aggregate investment is sufficient but is allocated between the sectors in a

manner inconsistent with the intended savings–consumption ratio, then the favoured sector will experience excess, and the deprived sector deficient, capacity.

In a free market economy this structural imbalance could trigger a cumulative upward or downward movement, the direction of movement depending on the relative strengths of the stimulus to the one sector and the depression to the other. However, the cyclical aspects of the model will not be discussed here. For the purposes at hand it is more profitable to concentrate attention on balanced, full capacity growth.

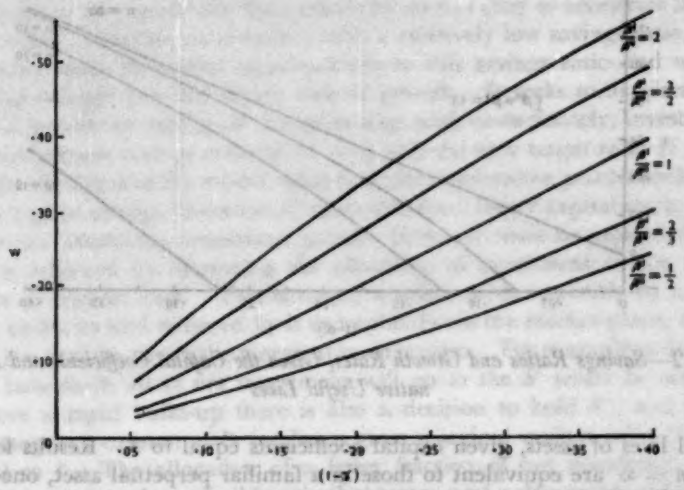

FIG. 1—*Investment Allocation Implied by Alternative Marginal Savings Ratios*

Given both capital coefficients and the savings ratio, the constant proportionate growth rate, i, can be derived from expressions (1) through (4) (see appendix):

$$i = \frac{(1-\alpha)}{\beta'(1-\alpha)+\beta''\alpha}\left(1-\frac{1}{(1+i)^n}\right) \tag{8}$$

The relationship between this expression and that for the growth rate in a simpler model, without replacement and with a single, homogeneous capital stock, is easily seen. If replacement is neglected, then $n = \infty$ and the second of the terms on the right reduces to 1. If, in addition, the capital stock is homogeneous, then the two capital coefficients are equal and the growth rate reduces to the more familiar expression,

$$i = \frac{(1-\alpha)}{\beta}$$

Various of the characteristics of the model are summarised in the accompanying charts. Figure 1 shows the relation between the marginal

savings ratio and the allocation of investment to each of the two sectors, given the ratio of the capital coefficients. Thus, when the capital coefficients are equal, the fraction of investment allocated to the investment-goods sector is the same as the fraction of marginal gross product that is saved. Higher capital coefficients in the investment- than the consumption-goods sector imply relatively larger allocations to the investment-goods sector while lower capital coefficients in the investment-goods sector imply the reverse. Figure 2 relates the growth rate to the savings ratio for alternative

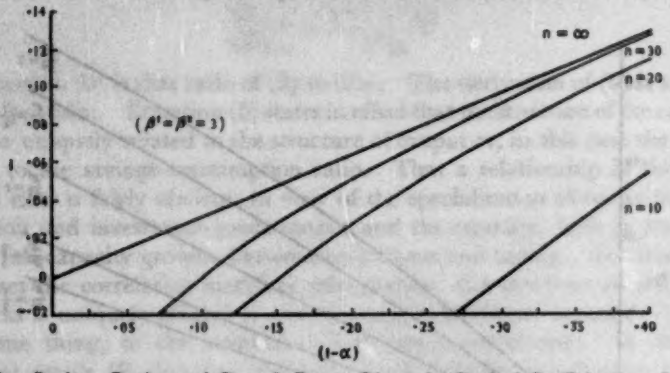

FIG. 2—*Savings Ratios and Growth Rates, Given the Capital Coefficients and Alternative Useful Lives*

useful lives of assets, given capital coefficients equal to 3. Results for the case $n = \infty$ are equivalent to those in a familiar perpetual asset, one-stock growth model. Lesser durabilities call for higher gross savings ratios to achieve a given rate of growth.

Explaining the Investment Allocation Pattern

Allocation by an economy of a relatively large fraction of its investment to the investment-goods sector may be explained by one or both of two circumstances. First, it may be attributable to a relatively high savings ratio or/and a relatively high capital coefficient in the investment-goods sector. Suppose, for example, that country A saves and invests at the constant rate of 30% of its gross product, while the corresponding figure for country B is 15%. Suppose further that in each country the capital coefficients in the two sectors are equal (even though possibly different between countries). Then we would expect, on the basis of equation (7) and Figure 1, that the fraction of investment allocated to the investment-goods sector in country A would be double that in country B. With equal asset life in the two countries and capital coefficients the same in both, we would expect also that the growth rate in A would be appreciably greater. A

lower capital coefficient in the consumption- than the investment-goods sector in A would imply a still greater emphasis by that country on the investment-goods sector, while lower coefficients in both sectors and greater useful life of assets than in B would widen further the difference between the two countries in growth rates.

Note that in the basic case just considered, whichever variant of it is chosen, the savings ratio, growth rate and composition of the capital stock —the ratio of S' to S''—are constant within each country.

Allocation of a relatively large fraction of investment to the investment-goods sector may result also from efforts by an economy to accelerate its rate of growth. Visualise an economy with a relatively low savings ratio, with a capital stock structured appropriately to this savings ratio and with a correspondingly low but steady rate of growth. It seeks to accelerate its rate of growth by raising its rate of savings and, co-ordinately, investment. Let the present savings ratio be $(1 - \alpha)$ and the new target ratio $(1 - \delta)$. Within the limits of the model, what does the acceleration process look like?

A higher savings (investment) ratio calls for a larger capital stock, S', in the sector producing investment goods. Hence S' must be expanded, and this is achieved by increasing the allocation of investment to this sector above its current level. This decision, whether made explicitly by a planning authority and enforced by it or implicitly via the market-place, carries with it a decision about the marginal savings ratio. For example, a decision that henceforth all of net investment will go to the S' sector in order to achieve a rapid build-up there is also a decision to hold S'', and hence consumption, constant. It implies a gross marginal savings ratio $(1 - \gamma)$ equal to 1. The allocation of a lesser fraction of net investment to S' would result in a slower build-up in that sector, and a slower rate of increase in the (average) savings ratio, while at the same time permitting some continued growth in S'' and consumption.

The relations governing the growth rate in each sector can be stated more explicitly as follows. The volume of investment in any period t is equal to the output of the investment-goods sector, $\frac{S'_{t-1}}{\beta'}$, and net investment is given by $\left(\frac{S'_{t-1}}{\beta'} - R_t\right)$. The rate of growth of the investment-goods sector, and of its output, can therefore be written

$$\frac{w\left(\frac{S'_{t-1}}{\beta'} - R_t\right)}{S'_{t-1}}$$

In the case where w, and $(1 - \gamma)$, equal 1, this reduces to $\left(\frac{1}{\beta'} - \frac{R_t}{S'_{t-1}}\right)$, and if replacement is neglected it becomes simply $\frac{1}{\beta'}$. Similarly, the rate

of growth in the consumption-goods sector, and of its output, can be written

$$\frac{(1-w)\left(\frac{S'_{t-1}}{\beta'}-R_t\right)}{S'_{t-1}}$$

or, neglecting replacement, $\frac{(1-w)S'_{t-1}}{\beta'S'_{t-1}}$. As w approaches 1, this term approaches zero. Where replacement is neglected, and given any constant positive value for w, it is seen that the investment-goods sector grows at the constant rate $\frac{w}{\beta'}$. This is true whether growth is accelerating or constant. However, the consumption-goods sector grows at a rising rate under acceleration because S' grows more rapidly than S''. Thus, during the acceleration phase G.N.P. grows at a rising rate. Inclusion of replacement, which becomes a shrinking fraction of total and sector output under accelerated growth, results in a rising rate of growth in the stocks of both sectors, in their outputs and in G.N.P. The time paths of S' and S'' under two alternative sets of conditions are illustrated in Figure 3. (Basis for consumption is given in the appendix.) Prior to $t = 0$, growth is at a constant, proportionate rate.

The nature of the acceleration process may be more readily perceived if it is viewed in terms of the average and marginal savings ratios. Suppose our hypothetical economy has an initial average and marginal savings ratio of 10%, capital coefficients in each sector equal to 2 and a useful asset life of 30 years. In these conditions its annual growth rate is approximately 3% (equation (8)). In order to build up S' and co-ordinately to raise the rate of investment, it must boost its rate of saving to some target level, say, 25%. This might be done by raising the marginal savings ratio from its present 10% rate to (say) 50%. With the marginal higher than the average savings ratio, the latter would rise over time and eventually reach the 25% target level (or any higher target level up to but not including 50%). At this point the marginal savings ratio could be reduced to equality with the average. The rate of investment would be correspondingly higher, and the economy would grow at the new constant proportionate rate of about 12% (equation (8)).[1] S' would bear a new, higher ratio to S'' than in the period before acceleration (equation (5)), and w would be higher than in the pre-acceleration phase but lower than during acceleration (equation (7)).

It is worth emphasising that there is a technological limit to the speed with which a transition from initial to target positions can be achieved. Because stocks are assumed to be specialised and non-transferable between sectors, increments to S' can come only from current investment. Thus, allowing for replacement, the limit is reached when the marginal savings

[1] Neglecting the interval required for the economy to "settle down" as replacement, which lags under accelerated growth, catches up.

ratio equals 1 and, relatedly, all of net investment is adding to S'. Besides this technological limit, there may be other, prior limits arising from the public's attitude toward increased saving, the power of a planning authority to enforce any particular marginal savings ratio or institutional barriers to the transfer of complementary resources between sectors.

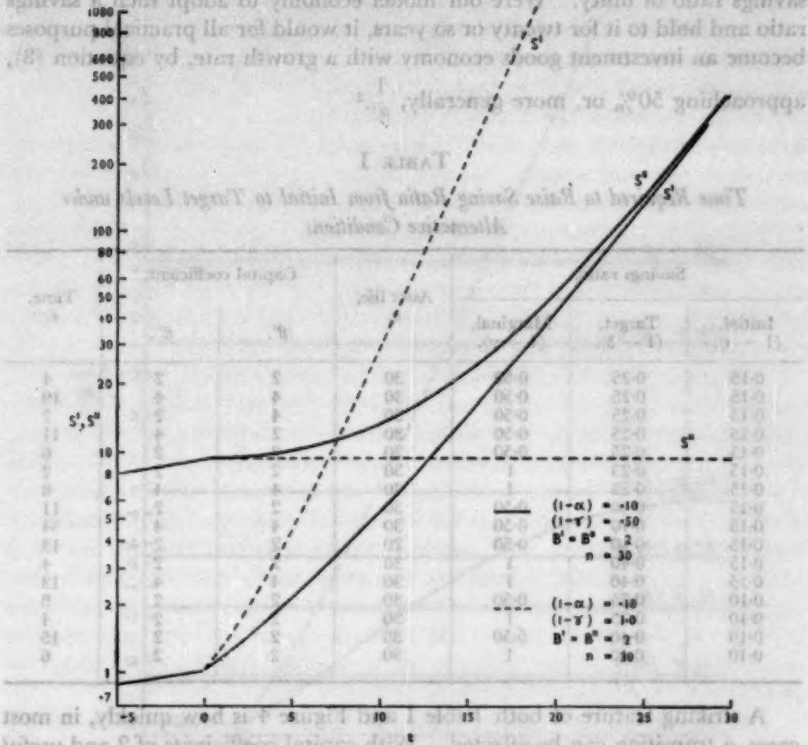

FIG. 3—*Growth Paths for S' and S'' under Specified Conditions*

The transition from a low to a higher savings ratio involves essentially a restructuring of the two types of capital, raising the ratio of S' to S''. The speed with which any transition is completed depends upon the values of the initial and the target savings ratios, the value selected for the investment allocation pattern or marginal savings ratio, the capital coefficients and useful asset life. Table I indicates, for several alternative sets of conditions, the time required to complete the transition process, while Figure 4 illustrates, for the same cases as Figure 3, how the structure of the stocks, $\frac{S'}{S''}$, changes

during transition. Since the horizontal lines on the chart indicate the structure of stocks appropriate to various savings ratios, one may read on the abscissa the time needed for transition from the initial to the target points.[1] The segment of the lines prior to $t = 0$ is horizontal because, in the pre-acceleration conditions of constant growth, the ratio of the two stocks is constant. The dashed line depicts the limiting case of a marginal gross savings ratio of unity. Were our model economy to adopt such a savings ratio and hold to it for twenty or so years, it would for all practical purposes become an investment goods economy with a growth rate, by equation (8), approaching 50% or, more generally, $\frac{1}{\beta''}$.[2]

TABLE I

Time Required to Raise Saving Ratio from Initial to Target Levels under Alternative Conditions

Savings ratio.			Asset life, n.	Capital coefficient,		Time, t.
Initial, $(1-\alpha)$.	Target, $(1-\delta)$.	Marginal, $(1-\gamma)$.		β'.	β''.	
0·15	0·25	0·50	30	2	2	4
0·15	0·25	0·50	30	4	4	19
0·15	0·25	0·50	30	4	2	7
0·15	0·25	0·50	30	2	4	11
0·15	0·25	0·50	20	2	2	6
0·15	0·25	1	30	2	2	2
0·15	0·25	1	30	4	4	8
0·15	0·40	0·50	30	2	2	11
0·15	0·40	0·50	30	4	4	34
0·15	0·40	0·50	20	2	2	13
0·15	0·40	1	30	2	2	4
0·15	0·40	1	30	4	4	13
0·10	0·25	0·50	30	2	2	8
0·10	0·25	1	30	2	2	4
0·10	0·40	0·50	30	2	2	15
0·10	0·40	1	30	2	2	6

A striking feature of both Table I and Figure 4 is how quickly, in most cases, a transition can be effected. With capital coefficients of 2 and useful

[1] Neglecting again the interval required for the economy to settle down.

[2] The achievement of very high rates of investment and growth presupposes, in addition to the necessary rate of saving, sufficient increases in the flows of complementary resources such as labour. If labour and other factor supplies fail to grow at the appropriate rate, the economy will be unable to use the new capital productively. For economies in an early stage of development, a partial answer to this difficulty lies in two circumstances. First, the natural increase in the labour force can often be significantly supplemented by more effective use of underemployed workers in the agricultural sector. Second, much of the new capital, based on the methods of advanced countries, is apt to be highly labour saving, thus holding down the need for new workers. For advanced countries, a partial answer may lie in the potential for saving labour and other complementary factors through rapid improvements in technology. If, as the rate of investment rises, increasing emphasis is given to productivity-improving research and development activity, the resulting productivity of the new investment will tend to minimise the need for additional complementary resources.

asset life of 30 years, and by saving half of the successive increments to output, the model economy can move from a savings ratio of 15%, with growth rate of 6%, to a savings ratio of 25% with growth rate of 12%, in less than 4 years. With a lower initial savings ratio of 10% and growth rate

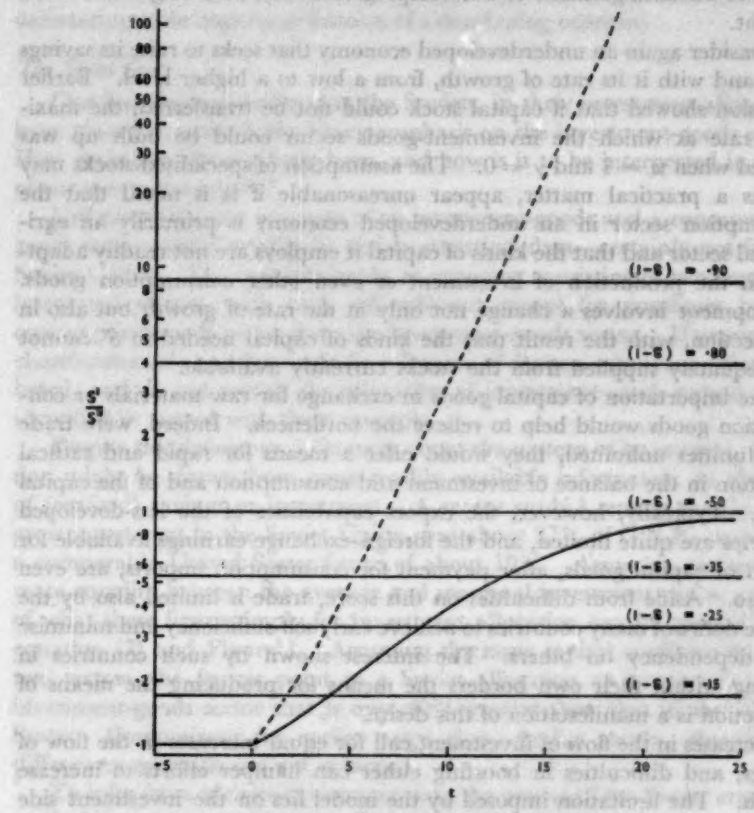

FIG. 4—*Growth Paths of* $\frac{S'}{S''}$ *Under Same Conditions as Figure 3*

of 3%, transition to the same target requires only about 8 years. If capital coefficients are as high as 4, the 15–25% transition increases substantially, to about 20 years, but with the growth rate rising from 1 to 5%. Even the longest of these periods is short when judged by its implications for material well-being. However, it is well to keep in mind that real economies are not model economies.

Relevance of Model to Underdeveloped Economies

Obviously the model makes use of some quite restrictive assumptions, two of the major ones being: (*a*) complete specialisation of the respective capital stocks, and (*b*) neglect of foreign trade. It seems desirable to note briefly circumstances that cause these limitations to be less serious, and the model to be more germane to a developing economy, than might at first be thought.

Consider again an underdeveloped economy that seeks to raise its savings ratio, and with it its rate of growth, from a low to a higher level. Earlier discussion showed that if capital stock could not be transferred, the maximum rate at which the investment-goods sector could be built up was reached when $w = 1$ and $\gamma = 0$. The assumption of specialised stocks may not, as a practical matter, appear unreasonable if it is noted that the consumption sector in an underdeveloped economy is primarily an agricultural sector and that the kinds of capital it employs are not readily adaptable to the production of investment or even other consumption goods. Development involves a change not only in the rate of growth but also in its direction, with the result that the kinds of capital needed in S' cannot be adequately supplied from the stocks currently available.

The importation of capital goods in exchange for raw materials or consumption goods would help to relieve the bottleneck. Indeed, were trade opportunities unlimited, they would offer a means for rapid and radical alteration in the balance of investment and consumption and of the capital stocks. Typically, however, the export capabilities of the less-developed countries are quite limited, and the foreign-exchange earnings available for import of capital goods, after payment for consumption imports, are even more so. Aside from difficulties on this score, trade is limited also by the intense desire of many countries to achieve early self-sufficiency and minimise their dependency on others. The interest shown by such countries in creating within their own borders the means for producing the means of production is a manifestation of this desire.

Increases in the flow of investment call for equal increases in the flow of savings, and difficulties in boosting either can hamper efforts to increase growth. The limitation imposed by the model lies on the investment side and implies a maximum incremental savings ratio equal to unity. That this figure may constitute a practical limit to the rate at which savings can be increased will perhaps be agreed to when it is recognised that an incremental ratio in excess of unity implies a decrease in the absolute level of consumption. In poorer countries the situation prevents this, not only because resources are not readily transferable but also because living standards already are minimal. In richer countries the familiar case is that where a consumption advances more or less in line with output, with the incremental savings ratio tending much closer to the average savings ratio than to unity. More generally, experience indicates that except in time of depression or war,

which are not relevant in the present context, or in a period of great stress, such as characterised the Soviet Union during the first five-year plan, peoples do not accept and governments do not impose cuts in the general level of consumption.

These circumstances suggest that the assumptions of specialised stocks and an absence of trade may not seriously impair the model's usefulness in delineating some important features of a developing economy.

The Soviet Case

One has the impression that the Soviets, in their investment allocation, have placed comparatively heavy emphasis on the investment-goods sector. How great has this emphasis been, and how is it to be interpreted in terms of our two-sector model?

Unfortunately, the concepts of an investment-goods and a consumption-goods sector cannot readily be tied to statistical data—certainly not for the Soviet Union. The concepts imply an economy consisting of two vertically integrated sectors, with each self-sufficient except for purchases by the consumption-goods sector from the investment-goods sector. However, the classification schemes that underlie collection of data on output are differently based, and do not permit the allocation of investment-goods output to be identified in accord with these concepts.

Despite this deficiency, inferences about the pattern of investment allocation might be drawn from more readily available information on the rate of (realised) savings or investment. A recent study [1] reports that in 1955 gross investment in the Soviet Union, was about 27% of G.N.P., as against a comparable United States figure of about 19%. Assuming an approximate equality between the average and marginal investment ratios, an idea of what these figures imply for investment allocation can be gleaned from equation (7) and Figure 1. Assuming the same capital coefficients in the two sectors, the figures point to a Soviet allocation of investment to the investment-goods sector that is over 40% greater than that in the United States. Comparisons for earlier years show similar results, though the differences generally are not so large.[2]

To infer from savings–investment data the extent of the Soviet emphasis on the investment-goods sector amounts, in effect, to explaining this emphasis in terms of a relatively high savings–investment ratio. In so far as the popular impression is correct that such an emphasis has existed, this explanation would seem to represent a reasonable and simple one.

[1] *Soviet Economic Growth: A Comparison with the United States*, prepared by The Legislative Reference Service of the Library of Congress (Joint Economic Committee Print, 1957), pp. 127–9.

[2] Under the assumptions specified, the margins by which the Soviet allocation exceeded that in the United States are as follows: 1950 = 16·5%; 1948 = 35·4%; 1955 = 110·9%; 1937 = 38·0%; 1928–29 = 22·8%. Of the years given, 1940 was an exception, with the margin favouring the United States by about 11%. For the source of the investment data on which these figures are based, see previous footnote. Original sources for the Soviet investment data are Hoeffding (1928), Bergson and Heymann (1937–48), and the Legislative Reference Service staff (1950–55).

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What of the acceleration process? Might it not also help to explain this apparent emphasis in the investment allocation pattern? Under accelerated growth, one would expect such symptoms as the following: (*a*) a rising ratio of S' to S''; (*b*) a rising rate of growth in aggregate output; (*c*) a rising savings (investment) ratio. The writer knows of no usable data on trends in the capital stocks of the two sectors. Estimates of growth rates in Soviet national product for each of several periods have been prepared by a number of western observers. Unfortunately, none of these is especially well suited to the purpose at hand, there being insufficient detail in the figures to permit satisfactory analysis. But one can say that they give no indication of an upward trend from the 1928–37 period to the 1948–55 period.[1] However, these data do not rule out the possibility of a significant increase in the rate of growth within the 1928–37 interval, the increase being completed, say, by 1934 or 1935. Such a possibility is consistent with our finding, developed from the model, that transition times in moving from a low investment-growth level to a high one may be comparatively short.

Data on Soviet gross investment as a percentage of G.N.P., in current prices, for selected years are as follows:[2] 1928 = 23·2; 1937 = 22·9; 1940 = 16·6; 1944 = 13·5; 1948 = 25·6; 1950 = 23·3; 1955 = 28·5. Neglecting the war years, these figures do not exhibit any persistent, substantial rise such as the acceleration hypothesis would imply. They are, however, in current prices, and thus would tend to conceal any tendency for the rate of investment to rise if the prices of investment goods declined over time relative to the prices of consumption goods.[3] A change of this nature in the price structure would result if technological advance, with consequent reductions in factor cost, were more rapid in the investment- than the consumption-goods sector.[4] In the absence of suitable data on the point, and in view of the prevalent impression that the Soviets have been a good deal more solicitous of their investment–heavy-producers'-goods industries

[1] One set of estimates of growth in national income, for example, are as follows:

Period.	Average annual rate of growth.
1928–37	8–9%
1937–40	6·5–7%
1948–50	12·5%
1950–55	7–8%

Figures for 1928–50 are from M. C. Kaser, "Estimating the Soviet National Income," ECONOMIC JOURNAL, March 1957, Vol. LXVII, No. 265, Table 1. (This article summarises estimates of Soviet growth by Clark, Grossman, Jasny, Wyler and others.) Figures for 1950–55 are from N. Jasny, "The Rates of Soviet Economic Growth," *The American Statistician*, June 1958.

[2] Joint Economic Committee Print, *op. cit.*, p. 127. The 1955 figure differs from that previously cited because the latter was subject to certain adjustments to permit more accurate comparison with the United States.

[3] Domar, *op. cit.*, pp. 238–9.

[4] It would result also if there were progressive subsidisation or underpricing of investment goods relative to consumer goods. In the figures cited, however, adjustments were made for both turnover taxes and subsidies in an effort to approach a factor-cost basis of valuation.

than their consumption-goods industries, this possibility probably merits a place on any list of explanatory alternatives.

An additional factor, germane to an explanation of investment allocation, warrants mention. In our model the capital coefficients, β' and β'', are treated as constants. Suppose, however, that the average β' were to rise over time relative to β''. Then, other things unchanged, the share of investment allocated to the investment-goods sector (w) would tend to be higher than otherwise, with the rising β' serving as a requirement for accumulating the additional investment goods. That part of w which, with a constant β', would serve to generate a rising savings ratio and rising growth, would here serve instead merely to build up β'. In this case a seemingly high w would be compatible with a stable savings ratio. Why, in Soviet development, might β' tend to rise relative to β''? It would do so if, in the early stages, the investment-goods sector were over-burdened as a result, say, of the abrupt launching of a large-scale development programme. For in that event β' would initially be depressed and there would be a consequent need, over time, to build it up. A rising β' might also be expected to accompany improvements in the quality of equipment, such as would tend to accompany technological advance and rising output.[1]

Nothing in the foregoing discussion permits firm judgments about the extent or the cause of the Soviet pattern of investment allocation. The writer is inclined to the view that the relatively high savings–investment ratio goes far to explain the apparently large emphasis on the investment-goods sector. This high ratio may itself have resulted from an acceleration process completed by the early thirties. Perhaps abetting the process was a substantial transfer of capital from the consumption- to the investment-goods sector, an occurrence which may reasonably have been expected even though precluded in the model by the assumption of specialised stocks. Alternatively, acceleration may have proceeded slowly, its effects concealed by changing relative prices, though this theory conflicts with the failure of the growth rate to rise over time. A possible rise in the capital coefficient in the investment-goods sector represents an additional explanatory ingredient. Given the limitations of the data and the model, it is probably unwise to press any single hypothesis too far.

The Consumption Economy

It is a fairly popular view that Soviet planners will not be able to maintain much longer their apparently heavy emphasis on investment. Rather they will be obliged, one year soon, to show greater concern for the material well-being of the citizenry by shifting the investment–consumption balance in favour of consumption. In terms of the model, this would involve a downward transitional process from high savings and growth rates, and from a

[1] Neglect of the consumption-goods sector, as by giving it low priority in the allocation of skills and capital and be failing adequately to meet its replacement needs, could result in a decline in β''.

relatively high ratio of β' to β'', to lower ones. The mechanism would be the reverse of that described previously. The incremental savings ratio would be reduced and held at some lower level until the new target (average) ratio, lower than the initial one, was reached. Associated with the process would be a decrease in w or, the same thing, an increase in the share of investment allocated to the consumption sector.[1] An alternative, admissible if the

TABLE II

Time Path of S'' under Deceleration and Capital Transfer

($1 - a = 0{\cdot}40$, $n = 30$)

		$\beta' = \beta'' = 3$				$\beta' = 6$, $\beta'' = 3$	
	Original path.	Deceleration.		Transfer of stock.		Original path.	Transfer of stock.
		$(1 - \gamma) = 0{\cdot}20$.	$(1 - \gamma) = 0{\cdot}01$.	$(1 - \delta) = 0{\cdot}20$.	$(1 - \delta) = 0{\cdot}10$.		$(1 - \delta) = 0{\cdot}20$.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	1·00	1·04	1·07	1·33	1·50	1·00	1·56
2	1·13	1·20	1·26	1·40	1·50	1·08	1·62
3	1·28	1·37	1·45	1·48	1·50	1·18	1·67
4	1·45	1·56	1·64	1·55	1·50 *	1·28	1·73
5	1·63	1·75	1·83	1·63 *	1·50	1·39	1·79
6	1·85	1·96	2·02	1·72	1·50	1·50	1·85
7	2·09	2·18	2·21	1·81	1·50	1·63	1·92
8	2·36	2·41	2·40 *	1·90	1·50	1·77	1·98
9	2·66	2·66 *	2·58	2·00	1·50	1·92	2·05
10	3·01	2·93	2·77	2·10	1·50	2·08	2·13 *
11	3·40	3·21	2·95	2·21	1·50	2·26	2·20
12	3·84	3·50	3·14	2·33	1·50	2·45	2·28

* Approximate year of interception of original growth path.

assumption of specialised stocks is abandoned, would be to transfer stock from S' to S'', thereby achieving the target in a single period.

A few of the possibilities are illustrated in Table II, which traces the time path of S'' and hence consumption. Column 2 shows S'' under high-savings, high-growth conditions. The constant proportionate rate of growth is, by equation (8), 13%. Columns 3 and 4 illustrate the effects on S'' following reductions in the incremental savings ratio and, relatedly, a re-allocation of

[1] The process of moving, via an acceleration path, from a low-savings, low-growth state to one of high savings and high growth is reversible. If w, and with it the incremental savings ratio, is reduced below some current and (let us assume) constant rate, S' will begin to shrink relative to S'', and the rate of investment and the rate of growth will begin to fall. In the limiting case, where all of net investment is allocated to the consumption-goods sector, the investment-goods sector, and with it the volume of investment, will cease to grow. The rate of investment will continuously decline, as will the rate of growth of consumption and of G.N.P. In the absence of replacement requirements, this declining rate of growth in consumption would be accompanied by a constant annual increase in its absolute amount. However, with finite asset life replacement would tend to "catch up" as growth slowed, and replacement requirements would rise relative to the volume of gross investment. More important, the continued expansion of S'' would generate additional replacement needs, and would do so until the whole of the constant volume of gross investment were absorbed, at which point S'' would also cease to grow.

investment in favour of consumption, while columns 5 and 6 show the consequences for S'' of a transfer of capital to it from S'. Columns 7 and 8 repeat the latter procedure for different capital coefficients. Under both deceleration and transferability, the level of S'' rises above the levels afforded by the initial conditions of constant growth, remains there for a time and then falls below them. The asterisks mark the approximate years of cross-over.

To illustrate, if the economy, as it moves along its 13% growth path, should decide upon a shift to consumption and, pursuant to this, transfer three-fourths of the capital stock in the investment-goods industries over to the consumption-goods industries (column 6), its consumption level would immediately rise by 50%. But the benefits, relative to those afforded by the initial growth path, would not endure. The growth rate would be reduced to zero,[1] and by the fourth year consumption would be no greater than would have been obtainable by remaining on the initial growth path. Thereafter, of course, it would fall ever farther below the latter. If β' is greater than β'', then a larger increase in consumption results from a given reduction in the savings ratio (compare column 8 with column 5), and the year of crossover is delayed. Benefits to consumption accrue more slowly under gradual deceleration as compared with transfer of stock, but they endure rather longer. (Compare columns 3 and 5.)

These figures suggest that the gains to consumers from a shift in the investment–consumption balance, while they may be appreciable in the near term, tend to be relatively short-lived. It follows that unless the time horizon is quite short, the discount rate quite high or β' very much greater than β'', an economy can best emphasise consumption be remaining on its initial, high-growth path.

A different interpretation may be in order if concern is not merely with more consumption goods, but with greater variety and improved quality. Changes of this sort are likely to involve shorter production runs and the use of better equipment and facilities. They might also entail more rapid obsolescence and more prompt replacement of capital. Hence useful asset life might be expected to fall and the capital coefficient to rise.[2] Under these conditions the willingness of consumers to continue saving at the current rate would not suffice to maintain the growth rate. Unless the savings ratio were boosted, movement to a lower growth path would be unavoidable. This may well be the type of situation which the Soviet economy, in its present stage of development, must face.

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[1] To maintain a constant level of output, gross saving and investment, and hence S', must be positive. If capital coefficients in the two sectors are equal the gross savings ratio consistent with zero growth is given by $\frac{\beta}{n}$. Derivation is in the appendix.

[2] The relevance of this point is reinforced by the past neglect of the Soviets in the areas of housing, urban facilities and transportation where capital coefficients are relatively high.

Appendix

A. Find relation (6), $\frac{\Delta S'_{t-1}}{\Delta S''_{t-1}}$:

$$\Delta S'_{t-1} = \beta'[Y_t(1-\alpha_t) - Y_{t-1}(1-\alpha_{t-1})] \tag{6a}$$

$$\Delta S''_{t-1} = \beta''[\alpha_t Y_t - \alpha_{t-1} Y_{t-1}] \tag{6b}$$

The bracketed part of (6a), if divided by $(Y_t - Y_{t-1})$, will express the ratio of the increment in saving in period t to the increment of output in period t, or the marginal savings ratio, while the bracketed part of (6b), divided by the same term, will express the ratio of the increment in consumption in t to the increment in output in t or the marginal consumption ratio. Hence the ratio of (6a) to (6b) may be written:

$$\frac{\Delta S'_{t-1}}{\Delta S''_{t-1}} = \frac{\beta'(1-\gamma_t)}{\beta''\gamma_t} \tag{6}$$

B. Find relation (8), the constant proportionate rate of growth, or i. In addition to (1) through (4), we have also $\alpha_{t+1} = \alpha_t = \ldots = \alpha_{t-n}$. Then modifying (4) gives:

$$Y_t = \alpha Y_t + \beta'(1-\alpha)(Y_{t+1} - Y_t) + \beta''\alpha(Y_{t+1} - Y_t) + (1-\alpha)Y_{t-n} \tag{8a}$$

Dividing by Y_t, combining terms and transposing gives:

$$\left[\frac{Y_{t+1}}{Y_t} - 1\right]\left[\beta'(1-\alpha) + \beta''\alpha\right] = (1-\alpha)\left[1 - \frac{Y_{t-n}}{Y_t}\right] \tag{8b}$$

Let $\left(\frac{Y_{t+1}}{Y_t} - 1\right) = i$. Since output grows at a constant proportionate rate, we have also $Y_t = Y_{t-n}(1+i)^n$.

Then (8b) becomes:

$$i[\beta'(1-\alpha) + \beta''\alpha] = (1-\alpha)\left[1 - \frac{1}{(1+i)^n}\right] \tag{8c}$$

and

$$i = \left[\frac{(1-\alpha)}{\beta'(1-\alpha) + \beta''\alpha}\right]\left[1 - \frac{1}{(1+i)^n}\right] \tag{8}$$

C. Find the savings ratio, $(1-\alpha)$, which yields a zero rate of growth. (8) can be rewritten:

$$\frac{i(1+i)^n}{(1+i)^n - 1} = \frac{1-\alpha}{\beta'(1-\alpha) + \beta''\alpha} \tag{9}$$

Binomial expansion gives:

$$(1+i)^n = 1 + ni + \frac{n(n-1)}{2}i^2 + \frac{n(n-1)(n-2)}{2.3}i^3 + \ldots \tag{9a}$$

and

$$\frac{i(1+i)^n}{(1+i)^n - 1} = \frac{i + ni^2 + \frac{n(n-1)}{2}i^3 + \ldots}{1 + ni + \frac{n(n-1)}{2}i^2 + \ldots - 1} \tag{9b}$$

$$= \frac{1 + ni + \frac{n(n-1)}{2}i^2 + \ldots}{n + \frac{n(n-1)}{2}i + \ldots}$$

If $i = 0$,

(9c) $$\frac{i(1+i)^n}{(1+i)^n - 1} = \frac{1}{n}$$

and from (9)

(9d) $$\frac{1}{n} = \frac{(1-\alpha)}{\beta'(1-\alpha) + \beta''\alpha}$$

Solving (9d) for $(1-\alpha)$ gives:

(9e) $$(1-\alpha) = \frac{\beta''}{\beta'' - \beta' + n}$$

If $\beta'' = \beta'$, we have

(9f) $$(1-\alpha) = \frac{\beta}{n}$$

D. Compute S'_t, S''_t and $\frac{S'_t}{S''_t}$ under accelerating and decelerating growth, given the capital coefficients, β' and β'', the useful life of assets, n, the initial savings ratio, $(1-\alpha)$, and the transitional (incremental) savings ratio, $(1-\gamma)$.

(10) $$S'_t = S'_{t-1} + w\left(\frac{S'_{t-1}}{\beta'} - R_t\right)$$

$$= S'_{t-1} + \frac{w}{\beta'}(S'_{t-1} - S'_{t-n-1})$$

(10a) $$S''_t = S''_{t-1} + (1-w)\left(\frac{S'_{t-1}}{\beta'} - R_t\right)$$

$$= S''_{t-1} + \frac{(1-w)}{\beta'}(S'_{t-1} - S'_{t-n-1})$$

An alternative for S''_t, more convenient in the present case, is

(10b) $$S''_t = S''_0 + (S''_t - S''_0)$$

which, substituting (7),

$$= S''_0 + \frac{(S'_t - S'_0)(1-w)}{w}$$

w is derived from (7) as given in the text. During the transition of acceleration or deceleration, γ, while differing from α, is held constant. Accordingly, w, whose value differs from that in the pre-transition phase, also is constant.

Since the value of S''_t depends on S'_t, a solution to S'_t will permit computation of S''. Equation (10) is a difference equation of the order $n+1$, with a solution of the form

$$S'_t = a_1 x_1^t + a_2 x_2^t + \cdots + a_{n+1} x_{n+1}^t$$

where $x_1, x_2, \cdots x_{n+1}$ are the $n+1$ roots and $a_1, a_2, \cdots a_{n+1}$ are the arbitrary constants that must be solved in accord with the $n+1$ initial conditions. The initial conditions are determined from the pre-transition phase of constant proportionate growth by letting S' equal some arbitrary initial value, finding the corresponding S'' from (5), and applying (8) for n periods.

An alternative to finding the roots of the difference equation is to use the recursive method whereby, given the initial conditions, each S'_t and S''_t are successively computed from (10) and (10b). This method, being the most economic in the present instance, was the one employed. Computations were performed on the University of Illinois digital computer. The machine was programmed to provide on a single run, for fifty periods answers for S'_t, S''_t and $\frac{S'_t}{S''_t}$. Solutions were obtained for alternative sets of parameters bracketing a fairly wide range of possible conditions.

CONSUMER ASSET FORMATION AND THE FUTURE OF CAPITALISM[1]

As one observes capitalism in underdeveloped and semi-developed countries, it becomes increasingly evident that there is some fundamental, qualitative difference in the dynamics of a fully developed capitalism (as that of the United States). In this note I will attempt to trace this difference primarily to what may be termed consumer (or household) asset formation. Since coming to Japan, I have been impressed by the vast contrasts in the economies of Japan and the United States, one a semi-developed and the other a fully developed economy. This paper will briefly define the term consumer asset formation, indicate its quantitative importance, set forth some of its basic characteristics and then explore certain implications relating to the long-term future of capitalism, especially in a world of competitive co-existence.

I. Definitions and Trends

By consumer asset formation we mean the purchase of dwellings and durables by households, corresponding respectively to the purchase of factories and machinery by business. Statistically, durables are generally (arbitrarily) taken to be commodities with an average lifetime of three years or more. In the U.S. Department of Commerce definition of consumer durables are included a number of minor durables such as books, tableware, radios, etc. Since these are not purchased normally on credit, we shall exclude them. Our concept will be confined to major durables and will include furniture, refrigerators, stoves, dish-washers, washing-machines and dryers, air conditioners, sewing-machines, vacuum cleaners, television sets and automobiles.

In the United States during the five-year period 1953–57 the purchase of major consumer durables amounted to $150 billion and residential construction to $88 billion, a total of $238 billion. This was 120% of the total purchase of construction and equipment by business ($197 billion). In comparison, Japan's percentage was only 36% in 1955.[2] In the United

[1] This paper, presented in 1959 before the economics faculty of Keio University and in 1960 at the University of Ryukyus and Hitotsubashi, is based on material I have prepared for the analysis of national-income statistics of less-developed countries, a project made possible by a grant from the Rockefeller Foundation in 1957. I have benefited from discussions and comments from many economists in Japan and in the United States, too numerous to mention here. But I would like to thank the economists of the National Bureau of Economic Research (United States), Hitotsubashi University and the Economic Research Institute of the Economic Planning Agency (Japan) for their criticisms.

[2] U.S. data from *National Income and Output*, U.S. Department of Commerce, 1959, pp. 118, 190. Japanese data is based on *National Income Accounts 1957 and National Wealth Survey 1955*, Economic Research Bulletin No. 1, Economic Planning Agency, Tokyo, 1959, p. 6, and Professor M. Shinohara's preliminary estimate of durables in *Keizai Kenkyu*, January 1959, p. 39, Hitotsubashi University. Consumer asset formation was 12% of G.N.P. in the United States and 3% in Japan.

States it is no longer producer or business fixed-asset production which dominates total production of durables and structures. It is convenient to distinguish between a fully developed and semi-developed capitalism on the basis of the relative importance of consumer asset formation against business capital formation. An economy such as Japan's in the midst of industrialisation (as was England during the lifetime of Marx in the second half of the nineteenth century) must apply most of its savings to investment in business capital formation. For convenience, one may distinguish between a semi-developed and an underdeveloped economy on the basis of the relative importance of business *fixed*-asset formation over against business *inventory* formation. (I have discussed this in a paper on capital–output ratios before the International Statistical Institute Conference in Tokyo, June 1960.) In contrast, the *un*developed stage is characterised by a rate of business capital formation that is close to zero. These four stages are constructed to serve as conceptual tools for isolating certain essential characteristics of present-day economies in different stages of development.[1]

The purchase of dwellings and major durables is a mass phenomenon in the United States which is not the case in Japan. For example, data for 1954 and 1955 show that two-thirds of the new car buyers were occupied as self-employed, clerical and sales, skilled and semi-skilled, unskilled and service workers.[2] In the use of the term "mass of households" below I refer to consumer asset formation in such households, excluding households of managerial and professional status and other upper-income groups.

This rise in consumer asset formation is not a temporary, passing phenomenon in the development of the U.S. economy. It is the logical outcome of an economy which has been rapidly growing in productivity for more than a century (for already in the latter 1920s consumer asset formation had begun to assume some significance, as indicated in the *Study of Savings* by Goldsmith). After the productivity (*i.e.*, the mechanisation) of the business sector grows beyond a certain level (reached in the United States probably around the period after the First World War; see recent studies of the National Bureau of Economic Research), the mechanisation (or "industrialisation") of the household sector becomes an objective of capitalist economy. The essential condition for attaining the stage of consumer asset

[1] These stages are, of course, different from those defined by Professor W. W. Rostow in *The Stages of Economic Growth* (Cambridge, 1960). The resemblance of my fully developed stage with his age of high mass consumption is more apparent than real. Since he thinks of the latter stage mainly in terms of consumer *durables*, particularly automobiles, he includes countries such as Japan, Germany and France in the mass-consumption stage. In my scheme they are still very much in the semi-developed stage, since my emphasis is on consumer *assets*, especially dwellings, concomitant with the fall in the capital–output ratio, particularly the proportion of structures to equipment. My stages are defined in terms of *k/o* ratios and are considerably more restricted in analytical usefulness than Rostow's.

[2] *Consumer Instalment Credit*, Part IV, Financing New Car Purchases, A National Survey for 1954–1955, Board of Governors of the Federal Reserve System, 1957, p. 17. About one-half of the families of clerical and sales, skilled, semi-skilled, unskilled and service workers own their homes, whose average value was $10,000 in early 1959, see *Federal Reserve Bulletin*, September 1959, p. 1107.

formation is a sufficient rise in the productivity of the business sector so that, on the one hand, the incomes of the mass of households are high enough to leave a substantial margin after the purchase of necessities, making possible the requisite repayments to sustain a large volume of consumer loans,[1] and on the other hand, the savings of enterprises and upper-income households are large enough to more than satisfy the capital requirements of business. To reach such levels of productivity, the large-scale mechanisation of every major branch of industry must be more or less completed so that productivity levels of enterprises within a given branch of industry are fairly uniform *and* high. In contrast, in a semi-developed economy such as Japan's there are many branches of the economy which are not industrialised, *e.g.*, agriculture, construction, etc., and within industrialised branches the degree of mechanisation is uneven, with the result that productivity differentials are enormous. (See *Economic Bulletin No. 2*, July 1959, Economic Research Institute, Economic Planning Agency, Tokyo, pp. 14–17.) This condition implies that the capital–output ratio for the economy as a whole has attained its peak and may be falling. As the detailed studies of the National Bureau of Economic Research indicate, the long-run capital–output coefficient for the business sector in the United States as a whole rose from the 1880s to around the 1920s and then fell.[2]

The fall in the coefficient is due to the development of capital saving technology and to shifts to industries producing final services, as many writers have pointed out. But more fundamentally, with the rise in *per capita* incomes, there is a slowing down in the rate of expansion of the commodity-producing sector as a whole due to the relative satiation in the consumption of food, clothing and other non-durables.[3] With this slowing-down, the expansion in the non-durable industries (and industries selling to non-durable industries) increasingly takes the form of greater investment in equipment and machinery instead of plant and structures. Investment in equipment per unit of structures rises, as the recent statistics of the National Bureau of Economic Research show. (Also see Kuznets, *National Product Since 1869*, tables on p. 218–19.) For it is possible to expand output by using more equipment within a given plant, building or structure or by the construction of additions or extensions within a given compound of plants

[1] See, *e.g.*, *Discretionary Income*, National Industrial Conference Board, New York, Technical Paper Number 6, p. 6. Discretionary income is estimated to be as large as essential expenditures in the United States in 1956.

[2] The definition of full development in terms of Harrod's capital–output ratio is convenient because through Harrod's equation, $GC = S$, it is possible to link the argument to capital and savings *required* for given growth rates. Also, as will be shown below, through the capital–output ratio it is possible to link the discussion to the rate of profit on capital.

[3] Even in 1957, non-durables comprised 45% of total consumption, with services 40% and durables 15%. In the first decade of the 1900s non-durables comprised over 60% of total consumption. Data based on Kuznets' *National Product Since 1869* (New York, 1946), p. 107, and *U.S. Income and Output*, *op. cit.*, p. 151. In Japan non-durables are from 70 to 80% of total consumption.

and structures. (See, *e.g.*, George Rosen, *Industrial Change in India* (Glencoe, Illinois, 1958), on the lower costs of extensions and additions to existing Indian steel mills.) The technological function of plant and structures in the process of production is the housing of labour, equipment and supplies so that structures are not directly output-creating. In contrast, machinery and equipment, like labour, are directly output-creating. For example, in two industries with the same amounts of capital and labour the one with a higher ratio of equipment to structures will have a lower capital–output ratio. Similar statements may be made for inventories which like structures are not directly output-creating, since inventories are kept by firms to take into account fluctuations in the volume of demand. The share of inventories in total capital tends to fall with the completion of a modern system of communications, transportation and marketing.[1]

A falling marginal capital–output ratio will signify declining requirements of saving per unit of additional output. With the saving–income ratio constant, saving can now be channelled to households for their purchase of assets. With interest rates falling, repayments per dollar of consumer and mortgage credit tend to fall. And with the development of technology the mechanisation of household activities and processes becomes possible, the durability of these equipment usable as security guaranteeing the safety of the loan. Thus consumer asset formation is the natural outcome of the maturation of the business sector of capitalist economy.

II. Income Distribution and the Share of Wages

As capitalism moves from the semi-developed to the fully developed stage, per worker productivity differentials (inter-firm, inter-industry, inter-occupational) narrow substantially with the completion of industrialisation. Family incomes in the lowest brackets tend to move into the middle brackets.[2] There is also a decline in the share of the highest income groups owing to the reduction in the share of property income payments. (See *U.S. Income and Output, op. cit.*, pp. 44–6, for data.) The reduction in the share of property incomes is partly due to the increased retention of earnings by corporations, but it is also due to a decline in productivity differentials (and

[1] If K denotes structures, Ki inventory and Ke equipment, K, total capital, is equal to $Ks + Ki + Ke$. For a given industry, over time,

$$K/o = f\left(\frac{Ks + Ki}{Ke}\right) \tag{1}$$

and more generally, for cross-section comparisons,

$$K/o = f\left(\frac{Ks + Ki}{Ke + w}\right) \tag{2}$$

where o is net output and w is wages. For a detailed discussion of the statistics of (1) see S. Kuznets, *Capital in the U.S.*, to be published soon by the N.B.E.R.

[2] This is not to say that there are no poor people in the United States. There is now in the United States an extensive study to analyse the causes of poverty in the lowest-income bracket. By share in this section, we refer generally to incomes *before* taxes. The decline in inequality will be even greater if incomes *after* taxes are considered.

therefore in the variance of profit rates) as between firms in a given industry and between industries, with the completion of industrialisation, just as in the case of declines in wage differentials. And apparently there has not been a marked increase in the concentration of corporate stock ownership. Robert J. Lampman in *Changes in the Share of Wealth Held by Top Wealth-Holders, 1922–1956*, Occasional Paper 71, N.B.E.R., 1960, finds that there has been a significant decline in wealth inequality in the United States, as in the United Kingdom, although corporate stock ownership " appears to have become no less concentrated " (p. 31).

The inequality of real income distribution probably declined even more. J. M. Clark (in *Economic Institutions and Human Welfare*, p. 112) has remarked that because of the spread of mass-production techniques, prices of consumer goods, especially durables, purchased by lower-income groups fell substantially more than those purchased by upper-income groups (*e.g.*, Ford cars over against Cadillacs).

The foregoing discussion implies that the share of wages in national income rose as against the share of income from property. (See S. Fabricant, *Basic Facts of Productivity Changes*, Occasional Paper 63, N.B.E.R., 1959, pp. 30–3. The problem and the data are discussed in detail in John Kendrick's *Productivity Trends in the U.S.*, soon to be published by the N.B.E.R.) And this will probably be true even if one takes gross national income (or G.N.P. at factor costs) since the capital–output coefficient has fallen to levels of the nineteenth century, although the relevance of including depreciation allowances in the denominator for the computation of income shares of economic classes is not clear. Unlike in England in the nineteenth century, labour was scarce relative to capital. In England during Marx's time cheap labour from traditional agriculture continually supplied low-wage labour to the growing industries, keeping the share of labour from rising. (Note the historical specificity of Marxian theory.)

III. The Average Rate of Profit in the Long Run

Even though the share of property income was falling, the average rate of profit did not decline but remained constant. This was due to the fall in the capital–output ratio, or what amounts to the same thing, the rise in its reciprocal, the output–capital ratio. For the economy as a whole, the return on capital, p, is equal to net output, o, minus wages, w. If we divide each term by K, total capital, we have the rate of profit equal to:

$$p/K = o/K - w/K \tag{3}$$

John Kendrick's forthcoming study, *Productivity Trends in the U.S.*, shows that while real wages per unit of capital rose, there was also an equal rise in the output per unit of capital (or a fall in the K/o ratio), so that the rate of return on capital remained virtually unchanged. Or in the words of Fabricant: " Productivity increase thus offset the effects of the rise in

capital per worker, and prevented the appearance of the absolute long-term decline in the rate of return on capital that might otherwise have been expected" (*Basic Facts on Productivity Changes*, *op. cit.*, pp. 30–1). Parenthetically, one should note that if the fall in the average rate of profit is slight and over very long periods (say, half a century), such changes need not have any unfavourable influence on capitalist investment behaviour. This is because the average in question is a highly artificial measure computed over innumerable ups and downs in the course of decades and over much dispersion between firms in a given industry and between industries, at a point of time.

At first sight it would appear puzzling that with the share of profit (p/o with o = national income) falling, the rate of profit should be constant and not falling. Marx's conclusions were somewhat the opposite, that the share of profits should be rising (increasing misery) and the rate of profit falling (decreasing accumulation and eventual breakdown). The crucial factor here is the capital–output (or its reciprocal) coefficient. If the capital–output ratio is rising very rapidly or its reciprocal is falling very rapidly in equation (3) so that (with o constant) the effect of the rise in K (in the terms o/K and w/K) more than offsets the fall in w, it is possible for both the rate of profit and the share of wages to fall. Under the special conditions of England in Marx's time, with a superfluity of labour and a shortage of capital and technology (since England was the first to industrialise), the capitalists could decrease the share of wages in order to install structures which required much capital per unit of output.[1] In the United States the moderate rise in K/o before the First World War and the subsequent fall enabled the share of wages to rise without lowering the rate of return on capital.

If, then, with full development, the capital–output ratio begins to fall there will be a tendency for savings to be excessive if the saving–income ratio is unchanged. Hence, capitalism in its full-development stage may escape the Marxian dilemma but only to fall in the trap of Keynesian excess saving. (Or with investment outlets diminishing, the marginal productivity of capital falls.) At this point, as previously noted, savings are channelled into households for the purchase of dwellings and major durables. The important thing to note here is that the decision of consumers to purchase durables and dwellings is not made primarily with an eye to profit maximisation but with the objective of maximising utility. In the *General Theory*, p. 61, Keynes glossed over this problem and took no stand in principle, although by using Kuznets' estimates of capital formation, p. 103, he

[1] Marx reasoned in terms of changes in the organic composition, constant capital and variable capital. For the analysis of the economy as a whole, these quantities are subject to duplications from a social-accounting point of view and also are not easily measurable. And there is a need for measurement, since the Marxian theory contains crucial empirical assumptions regarding changes in organic composition, the rate of surplus value, etc. For the conclusions regarding increasing misery and falling profit rates, the numeraire used by Marx, weighted labour time, is largely irrelevant.

implicitly favoured the inclusion of owner-occupied dwellings as business investment motivated by profit maximisation. Nevertheless, the purchase of consumer durables and dwellings by households is primarily motivated by the desire to satisfy wants—whether these be the desire to lighten housework and increase leisure, the desire to " keep up with the Joneses," the desire to own assets, the desire for personal privacy and convenience, the desire to exercise the instinct of workmanship, etc. Some element of profit motivation (or as Professor Hoselitz puts it, loss minimisation), cannot be denied to exist, especially in the purchase of dwellings, but this element is distinctly secondary. This implies that household asset formation (which exceeds business asset formation) and utility motives are as important determinants of national income and employment as business investment and the profit motive in the United States. Accordingly, when there is a decline in business investment (due to falling profit rates or their expectation, and this in turn from whatever ultimate causes, *e.g.*, oligopolies, excessive allowances for depreciation, etc.) the excess saving is channelled through the capital market to the mass of households.

The point of the foregoing is that the rate of profit and the capitalist motive to accumulate no longer play the role that they did in Marx's time. The Gordian knot which tied the fortunes of capitalism to the profit rate is considerably loosened. In nineteenth-century capitalism business investment fell when profit rates fell, then income originating in production declined. This, in turn, caused personal income to fall, then aggregate demand to fall, thus establishing a cumulative chain of contraction. But now, a fall in profit rate and business investment may merely shift excess savings to households whose power of consumption is no longer restricted to current incomes, originating in production.[1] Since the desires of the masses of households are extensive,[2] their power of consumption is limited by their power to obtain credit, just as in the case of capitalists in Marx's time. Households can borrow up to the point where down-payments and monthly repayments on loans do not exceed that part of income remaining after current consumption needs and normal saving are satisfied. This residual is a flexible margin, depending on the extent to which current

[1] Thus, in the nineteenth century it was the rise in the capital–output ratio which lowered the rate of profit and started the cumulative downward movement. But with the capital–output ratio no longer rising it is the fall in aggregate demand which reacts on the profit rate, so that the latter is determined not by the independent movement of the capital–output ratio but by aggregate demand, as Keynes and Kalecki have argued. Note here how the laws of economics are conditioned by institutions and stages of development.

In order for Marx's capitalists to accumulate and accumulate (to satisfy the requirements of a rising marginal capital–output ratio), wages had to be kept down. But in the United States to-day, to keep the rate of profit high, mass consumption is needed, and this entails high wages and loans to consumers in the lower-income brackets. These changes tend to blunt the sharpness of class struggles and inject an element of class harmony.

[2] If, for example, there is a relative satiation for durables and dwellings, loans to finance higher education may become extensive, since the propensity for university education is rapidly rising in the United States. (Or to finance foreign travel.)

consumption and normal savings can be depressed or pushed down. The very fact that repayments *must* be made forces down current consumption of non-durables, services and normal savings, and encourages the entry of housewives into the labor force. (See below on the consequences of these pressures.)

IV. Cycles

For short-term fluctuations, such as cycles, consumer asset formation has important implications. Unlike business investment in construction and equipment, consumer assets are purchased mainly for their utility—yielding properties, and as such they can serve as appropriate counter-cyclical devices. With declining profit prospects, business investment may fall, but if excess savings are channelled into households for the purchase of dwellings, major durables, etc., a recession may be checked in a short time. And this is especially true if saving is shifted also to local-government expenditures on construction (roads, schools, parks, etc.) and equipment which have been steadily expanding and whose investment is also motivated mainly by utility rather than profit considerations and is complementary to a certain extent with consumer asset formation.

This substitution of consumer asset formation for business capital formation took place during the last two recessions. From the fall of 1954 there was a large increase in the purchase of automobiles and dwellings, even though business purchase of new plant and equipment fell during 1954. The rise in automobile purchase was especially sharp in 1955, mainly due to improved models and favourable terms of consumer borrowing (*i.e.*, the lengthening of the maturity of the loan from twenty-four to thirty-six months). In the last recession savings flowed into the housing market, and it was mainly residential construction which sparked the recovery of late 1958, despite declining business confidence and investment. (Dr. Gerhard Colm has pointed out to this writer that about half of U.S. families still do not own their dwellings.)

One great danger remains, the possibility of a collapse such as in 1929. In such an event, consumer confidence can be shattered, and the drop in consumer asset formation will intensify the drop in business investment. But with built-in stabilisers, union wage floors and farm parity prices, measures which were not in existence in 1929, collapses are probably avoidable.

To improve the use of consumer asset formation as a counter-cyclical device, there is a need for appropriate selective credit controls on instalment credit. This may be limited to the regulation of down-payments and perhaps maturity periods as in the United Kingdom and other European countries. Such controls are necessary to limit the purchase of consumer assets in expansion and this in part to encourage their purchase in contraction, in effect therefore to postpone purchases of consumer assets when incomes are rising (due to increases in business investment) to later periods

when incomes are falling (due to decreases in business investment). It is not sufficiently appreciated in the United States that the utility-maximising property of consumer assets and the need for loans to finance their purchase by the masses of households made this type of purchase peculiarly amenable to policy controls. And these controls need not work with precision and perfection, since with built-in stabilisers the decline in personal income during contraction may be moderate for a year or even two.[1] In any case, the policy of discouraging borrowing by households and governments in expansion and of encouraging such borrowings in recession is a far less-drastic and complex policy device than deficit financing on a substantial scale or attempts to stabilise business investment.

V. Semi-developed Countries

The extent to which the foregoing can serve as counter-cyclical devices in semi-developed countries depends on the levels of productivity and real income which govern the magnitude of mortgage and instalment credit extensions. To the extent that the severity of contractions may be less than in the United States, consumer asset formation may be effectively employed as a counter-cyclical measure. However, semi-developed countries (such as Japan, for example) may find it more desirable to emphasise the shifting of excess savings into loans for local governments to finance social overhead investments, *i.e.*, roads, public housing, schools, parks, welfare institutions, hospitals, dams and irrigation works, sewage systems and water works, etc. The external economies from some of these projects may be substantial in the semi-developed stage.

In countries where the problem of deficits in the balance of payments becomes acute during contractions (such as Japan) the attempts to shift excess savings to households and governments may worsen the balance of payments. However, in a revealing study by the Institute of Economic Research, the Economic Planning Agency of Japan, entitled *Degree of Dependency of Consumption on Imports*, Series 3, 1960, it was found that where the labour input bulks large in total input, the production of most consumer durables does not require large amounts of imports. Since labour input is very large in dwelling and public works construction, the findings of the Institute may be extended to the latter also.[2]

[1] On built-in stabilisers in the last two recessions, see *U.S. Income and Output*, pp. 23–4, also see pp. 152, 154, 165, 193. See also discussion on other stabilising forces by Arthur F. Burns, *American Economic Review*, March 1960. Also see Leo Grebler, *Housing Issues in Economic Stabilization Policy*, N.B.E.R., Occasional Paper 72, pp. 101–5.

[2] A useful social-accounting device to detect quickly excess savings is the financial transactions accounts (or flow of fund accounts) which integrate within a system of accounts financial flows with income-expenditure flows. In the very short-run, before excess savings can exercise their full impact on the rate of production, the financial transactions accounts may reveal that the financial surplus in the corporate and household sectors together are exceeding their financial deficits, *vis-à-vis* the banking sector, as was the case in Japan in 1955 and 1958. (*Kokumin Shotoku Hakusho 1958*

It was noted above that the K/o ratio tends to rise in the semi-developed stage and under the conditions of nineteenth-century England the implicit assumption by Marx that the ratio rose is probably valid. Nevertheless, there is nothing inevitable about this, particularly because the United States experience in the nineteenth century shows that the rise is not very large and can be offset by the import of technology and by improving the quality of labour through extensive mass education. Unlike in Marx's time, the backlog of new technology which can be transplanted into present-day semi-developed countries is very large, and these can have enormous capital-saving effects. (The secret of Russian and Japanese successes in industrialisation is probably this import of technology and mass education.) As a result of the extensive research by the National Bureau of Economic Research into productivity trends in the United States, we are able to infer that perhaps one-half of the increases in productivity was due to improvements in the *quality* of labour and capital, besides changes in production scale. Many studies are now under way in the United States, attempting to measure the productivity of education, and very preliminary results show that it is very high. Hence, the K/o need not rise to squeeze the profit rate.

Moreover, even with moderate rises, with a consequent fall in the average rate, the question remains: to what extent does this affect capitalists' investment behaviour? In the world to-day the structure of most semi-developed economies is dualistic, with a modernised sector, on the one hand, and a quasi-traditional sector, on the other. Even though the overall average rate of profit may be falling, the average for the former may be rising, and it is the former which accounts for most of the investment, as in the case of Japan.

VI. Underdeveloped Countries

But the time may come in the future when households possess enough durables, dwellings, etc., so their marginal utility falls for a large number of families. When this point is reached the volume of autonomous saving and debt repayments (which are really a form of induced saving flow) may exceed the borrowing capacity or needs of business, government and households. (At this point the volume of repayments is at its peak, since repayments are chiefly a function of total debt outstanding. See for details my note in the *Review of Economics and Statistics*, February 1958.) From the viewpoint of capital demand, in 1957 the peak of industrial and public utility construction seems to have been reached in the United States, although its fall in 1958–59 has been more than offset by rises in residential, commercial and local government construction. (See *Federal Reserve Bulletin*, April 1960, p. 423.)

Even before this point is reached, it is desirable to shift the excess savings

(National Income White Paper), Economic Research Institute, Economic Planning Agency, p. 31.) Since it is possible through banking statistics to obtain good approximations to such financial surplus and deficits on a monthly basis, we have here a good device to detect excess savings flow in time for policy considerations.

to the foreign sector, to semi-developed countries and especially to underdeveloped countries. But before private savings can flow freely from households in the United States and other Western countries the underdeveloped countries must invest in social overhead projects which private enterprise does not find profitable to undertake. These are mass education and training, a system of mass communications, transportation, research, public works, social welfare, sanitation, etc. These projects are necessary not only because they yield external economies for private enterprise, as some economists are inclined to argue, but perhaps even more important, these are the projects which will enable private enterprise operating under conditions of underdeveloped economies to allocate and utilise resources most efficiently, fulfilling the basic conditions of long-run competitive equilibrium. In order for the entrepreneur to maximise output, for the consumer to maximise satisfaction and for the worker to maximise his earnings, knowledge of and information about profitability in other industries and regions, about other products and other jobs are required and the *mobility* of capital, commodity and labour must be feasible. Without education, it is not possible for entrepreneurs, consumers and workers to read and evaluate such information. Without a system of modern communications, it is difficult for the information to be disseminated. And without a system of modern transportation it is difficult to act on the information supplied. Moreover, it is through the educational system that the level of rationality of future entrepreneurs, consumers and workers is raised (not to mention the changes in attitudes regarding the size of households, fertility rates, etc.). And capitalist enterprise requires rational behaviour by all toward economic activities.

More is involved than the efficient allocation of resources in the above. Since the long-run competitive equilibrium theory is static, it does not allow for changes in average work effort or work intensity per hour, in techniques, in skill and rationality, within the firm. But the increase in competition as among workers, consumers and entrepreneurs involves a general rise in work intensity, in rationality and in the ability of workers and entrepreneurs, besides promoting innovations (in the small).[1]

Since the financing of all these projects requires large government expenditures, the sums saved from disarmament under conditions of competitive coexistence should be shifted in the form of low-interest, long-maturity loans to the governments of underdeveloped countries. (Judging from my present study of the Meiji government accounts, something like an increase of from 50 to 100% in the current level of government expenditures

[1] In the process, inefficient and incapable workers and entrepreneurs are eliminated. The social-welfare projects are needed to care for, retrain and adjust the lives of these individuals who fall by the wayside due to sickness, poor training, accidents, misfortune, etc. Since society has invested at least fifteen years of food, clothing and other expenses in raising to maturity the labour power of these individuals, it is clearly a waste to ignore the plight of these people, leaving aside humanitarian considerations.

seems to be indicated.) As external economies and the conditions for the efficient operation of private enterprise are gradually developed (and these should as a by-product bring increasingly political and social stability), the flow of private savings from households and enterprises in the West, preferably through international and public institutions, should become feasible. On this basis, both the cyclical and secular expansions of both the developed and less-developed sectors of the capitalist world are assured.

VII. Rationalisation of Consumption

There are other aspects of consumer asset formation which are worth studying in assessing the long-term future of capitalism. For example, the marginal utility of consumer assets to the masses of households is probably high, much higher than that of most non-durable consumption goods. This is because the services they yield are generally of superior quality or are obtainable in more convenient form. This may be inferred from the willingness of the masses of households to go into debt in order to purchase them, repaying out of savings and especially out of reduced purchases of non-durables and certain services. (In Japan television sets, washing-machines and refrigerators are referred to as " the three treasures of modern Japan " in contrast to her three legendary treasures.) In part, the use of consumer assets enables households to curtail the purchase of non-durables and services. With television, there is less need to go to the movies; with washing-machines, vacuum cleaners, dish-washers, etc., less need to hire domestic servants or to send clothing to laundries; with automobiles, less need to use buses and trains; with the use of energy in the form of gasoline in automobiles and electricity for appliances, less need to obtain energy from food; with automobile travel, less need for clothing, shoes, etc. But probably more important than these substitutions is the desire of households to cut down the excessive consumption of food, clothing and other non-durables in order to repay as soon as possible their current debts and buy other assets. The pattern roughly is first to purchase minor durables, then major durables other than automobiles, then automobiles and then houses. The desire to possess durables serves as incentive to rationalise consumption patterns. It is a striking fact (of course, not entirely attributable to durables) that in the period 1946–57, when *per capita* total consumption rose 20%, there was no change in *per capita* consumption of food, beverages, clothing and shoes, whose total value in 1946–52 was $595 and in 1953–57 was $553. (All data in constant prices are from *U.S. Income and Output*, p. 151, and the *Statistical Abstract*. I am informed that in Japan, too, the substitution of durables for non-durables is observable in the recent family budget data.) The availability of durables to the masses of households in the United States has prevented rising incomes of these households from being wasted in the frivolity of consumption patterns implicitly prophesied for American civilisation in Veblen's work, especially in the *Theory of the Leisure Class*. A

consumer-durable pattern of consumption is a far cry from that implied in the massive pyramids of Egypt, the gilded shrines of Tokugawa's Toshogu, the Taj Mahal of India or even that of "America's 60 Families," which suggest a picture of large retinue of servants, elaborate parties, exotic foods, priceless garments, jewellery and decorations of precious metals, palaces, etc.

In evaluating Veblen's work on consumption, one must remember that he wrote before the rise of consumer durables in American civilisation and drew his observations from archaic cultures. At the end of a brilliant analysis of modern machinery Marx noted that the enormous increases in productivity were transformed into a vast domestic servant class in England of 1861. Out of a total labour force of 8 millions, he found that 1·2 millions, or 15% were domestic servants and this, he noted, did not include servants in farm households. In the United States in the 1950 Census only 3% were counted as "domestic servants." Apparently there has been a large-scale substitution of "modern domestic slaves" (the term Marx gave to domestic servants) by consumer durables (*Capital*, Kerr Edition, Vol. 1, pp. 448–9, and *U.S. Statistical Abstract*, 1956, p. 218).

On the whole, despite much that is irrational and frivolous in American consumption, the underlying tendency in a broad historical context is unmistakably toward functionalism and rationality. This view is opposed by John Galbraith, whose thesis in *The Affluent Society* is that the marginal utility of a "substantial part" (referring largely to consumer durables) of total output in the United States is zero because the demand for it is "contrived," *i.e.*, it does not arise in spontaneous consumer need but must be artificially created by advertising, exhortation, emulation, etc. (pp. 159–60). This definition assumes an extremely narrow and restricted view of welfare. The wants of mankind beyond basic necessities are in some sense all induced or contrived. This is true of not only the demand for fine arts but also for elementary education, which in the United States from the mid-nineteenth century was compulsory and state-subsidised. And even in some cases with necessities, some "contrivance" is needed—as is the case with bread, vegetables, milk and other consumption in countries such as Japan. On the other hand, contrived consumption, such as the purchase of durables, can be beneficial.

VIII. Propensity to Work

In normal circumstances the work participation rate of the population (the percentage of the population in the labour force) tends to decline with the growth of the economy from underdeveloped through the semi-developed stages. This is largely due to the withdrawal of women from the labour force with the shift from agriculture to industry, and rising incomes. As in other magnitudes expressing patterns of behaviour (*e.g.*, capital–output ratios, concentration ratios of income and wealth inequality, fertility rates, etc.), there is a reversal in the participation rate when full development is

reached. Clarence Long has found that the female participation rate tends to rise in the United States.[1] In part, this is due to the lightening of housework made possible by durables and, perhaps more important, it is due to the need to repay instalment debts as soon as possible, so that new debts can be contracted to buy additional durables.

IX. Social Implications

A subject far beyond my competence is the impact of consumer durables on social life. However, I venture to speculate that durables have strengthened the family as an institution. Larger and more pleasant homes, television and radio sets, machinery for gardening, crafts and other home activities, the motorisation of family living have brought the focus of social ties back to the family and home. And partly because the marginal cost of rearing a larger family is lowered by the use of vacuum cleaners, washers, dish-washers, television sets, automobiles, refrigerators, larger houses, etc. (*i.e.*, the cost of rearing an additional child falls sharply due to " economies of scale "), the fertility rate tends to rise. (To the extent that there is truth in Hansen's theory of population decline and economic stagnation, and I believe there is, if one assumes that consumers can borrow to augment their purchasing power, this tendency is favourable to future growth.) At the same time the housewife is freed from menial drudgeries, and more pleasant employment outside the home is opened to her.

Most interesting, the ownership of the automobile, dwelling, television set, etc., has made suburban living possible and attractive. Instead of living in the city, it is possible for workers to live outside or far from their place of work in healthier, pleasanter areas. The cities of the United States are increasingly becoming the locale of work only, and residences of city people are found more and more outside the city.

According to a recent U.S. Department of Labor report, between 1950 and 1958, urban population rose only 4%, but suburban population rose 44% and rural non-farm population rose 43%, while the farm population dropped 14%. In the course of development, urbanisation increases with the rise in *per capita* income, but once the fully developed stage is reached, urbanisation tapers off and suburbanisation begins. In the early underdeveloped stage to a large extent the home and working-place were one and the same. With development, the number of workshops and factories grows, and since the equipment and labour force involved are too large for a home, there occurs a separation of work-place and residence, although both are located within the urban areas. In the fully developed stage workplace and residence need not be in the same area. John Ruskin and Thomas Carlyle would find it difficult to believe that the suburbs of America grew out of the civilisation they had castigated.

[1] *The Labor Force Under Changing Income and Employment* (National Bureau of Economic Research, New York, 1958), p. 268.

X. The Growth Rate and the "Catching-up" Problem

The comparison of growth rates between a fully developed and a semi-developed economy is likely to be misleading. With the shift of savings increasingly to consumer assets in a country such as the United States, the productivity of savings, as measured by conventional G.N.P. concepts, is likely to fall. In the national accounts of the United States, the services of owner-occupied dwellings are measured by imputing a hypothetical rent, and the services of consumer durables are measured by interest payments on personal debt (see *U.S. Income and Output*, *op. cit.*, p. 150). The total of these in 1949 is $14 billion. The latest year for which R. Goldsmith estimates the total value of owner-occupied dwellings and consumer durables is 1949, at which time it is given as $158 billion and $100 billion, respectively, a sum of $258 billion (*A Study of Savings*, Vol. 3, p. 107). The average K/o ratio for consumer assets works out to be 18·0, which implies an extremely low productivity coefficient. The reason for such a high capital–output ratio is twofold: first, because dwellings are structures like plant and factories and hence low in productivity (see above); secondly, the use of interest payments on personal debt is a wholly inadequate method of measuring the services of consumer durables. The interest payment does not measure the services of durables which are bought for cash, nor the down-payment advanced for credit purchases. Also durables continue to be serviceable long after the debt is paid. Above all, is the question: in what sense do interest payments reflect the services of durables? [1]

As the U.S.S.R. and other semi-developed countries grow and move out of the semi-developed stage in the coming decades, consumption patterns will gradually shift from non-durables to durables and services, since the marginal use-value of non-durables will fall relative to durables and final services with rising incomes. Then, increasing portions of saving must be allocated to finance the construction of dwellings and the production of durables, both of which do not create the capacity to produce material goods as in the case of investments in factories and machinery. When this stage is reached, the Soviet concept of national income as net material product is likely to show a downward bias, since both services of dwellings and consumer durables and also final services will become an increasing proportion of net material product. (Up to the present stage, net material product shows an upward bias, since these services have been a decreasing proportion of net material product.)

Also since in a semi-developed economy differentials in productivity per worker between firms, between industries and between occupations are very large, each investment in plant and equipment is likely to raise productivity

[1] In *A Critique of the U.S. National Income and Product Accounts* (N.B.E.R., 1958), Vol. 22, pp. 18, 50–1, 124, 267–78, George Jaszi and others recognise the inadequacies of using interest on personal loans to measure services of durables. In the United Nations and O.E.E.C. accounts such interest payments are excluded and no attempt to measure the services of durables is made, since no method is available.

per worker more rapidly than in a fully developed economy where such differentials are smaller, especially when the latest technology can be imported (and need not await invention) by semi-developed countries such as Japan and the U.S.S.R. (In the latter 40% of the labour force is still in agriculture according to the 1959 census; this compares with 33% for Japan. But the comparison is not quite fair to the U.S.S.R.)

Also as the Soviet economy becomes increasingly consumer-oriented the aspirations for higher living standards take a number of forms, one of which is the demand for improvement in quality (comprising better and new products with greater varieties). The quality of Soviet consumer goods, especially durables, is said to be notoriously low. Improvements in quality are difficult to take into account under existing methods of national-income estimation. Despite enormous improvements in the quality of American consumers goods in recent decades, only a small part is said to be reflected as increases in output in the United States' real product series.[1]

The comparison of growth rates of countries in different stages of development is as misleading as comparing the rates of increase in the height of teen-age children with that of grown adults. For reasons presented above, the Soviet growth rate (as well as those of other semi-developed countries) will taper off as full maturity is reached, so that it may take much longer for the Soviet Union to " catch up " with the United States than present rates of the two countries tend to indicate.

XI. Conclusion

The conclusion that emerges is that as capitalism reaches the stage of full development of its business sector a new vigour is added into its structure and operations. Such a conclusion is encouraging for the future of world peace. This is because the maintenance of a stable world economy in an era of peaceful competitive co-existence will require that capitalist countries make some progress, since it can be taken for granted that Communist countries through the mobilisation of large volumes of savings will progress rapidly.[2]

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[1] See G. Jaszi and John W. Kendrick, *Problems and Techniques of Measuring the Volume of National Product*, mimeographed paper presented at the 3rd Regional Conference of Statisticians, E.C.A.F.E., March 1954, New Delhi, p. 33. John Kendrick, who was mainly responsible for the deflation of U.S. G.N.P., has pointed out to me that there is a significant downward bias in the deflated government product.

[2] The weak point of Communist planning is, perhaps, the problem of adequate incentives to raise work intensity, defined as the quantity of work of a given quality put forward per hour of labour. An attempt by the Government to squeeze savings beyond a certain point is likely to affect the intensity of work adversely. Japan to-day is an example where both the saving rate and the intensity of work are high, the possibility of buying consumer durables having something to do with the latter. These together with a high level of skill (due largely to education) and rapidly changing techniques (due largely to the import of technology), have resulted in a rapidly rising national income, despite extremely inadequate natural resources.

A GENERALISATION OF THE MULTIPLIER–ACCELERATOR MODEL[1]

Introduction

A model is generalised not as an end in itself, but to gain a perspective of the conclusions attainable from a given class of assumptions. The properties of the output path resulting from a generalised multiplier–accelerator model have not been fully explored in the literature. The tendency has been rather to introduce a lag here, or relax some small assumption there, in the hope that this will provide a break-through to completely new pastures.

The aim of this article is to remedy this deficiency, and no apology is made for the generality involved in doing so. Taking the basic hypothesis, so common in many branches of economics, that present actions are determined consistently by past events, one can work to the output path implied, and incidentally realise just where development is held back by lack of the right mathematical techniques. Though such may appear a sally into the unknown, the writer is starting with a background of Hicks' *Trade Cycle* [3] where, in the appendix, the author suggests extending the analysis to any number of lags; with Goodwin's examination of the multisectoral multiplier [2]; and finally with Chipman, who, while studying this multiplier in detail, contributed to this field by taking the Samuelson–Hicks interaction model [3, 5] over to a multisectoral economy [1]. He suggested such an extension but did not proceed to examine the output path produced. This will be done here as a particular case of this article's final model.

Nor will the analysis be confined to linear relations between present and past events, for it is part of the generaliser's task either to indicate what happens in these cases or, at least, to show why most of them cannot be examined in any meaningful detail.

Part I. The Unisectoral Case

An economy's experience is the basis of its actions. Experience having a span of ten years implies that economic events which occurred more than ten years ago do not influence to-day's behaviour, whereas events within the last decade do. Assume that the demand for consumption goods is some weighted combination of outputs of the previous p periods, with recent levels of output being the most influential. One great drawback to such a postulate is that experience is rarely so rigidly consistent. Jolts, such as the depression of the thirties, remain indelibly fixed in men's minds, and affect thinking and behaviour beyond the time span attributed to them. Nevertheless, assume that consumption is determined in some regular and

[1] I am grateful to Mr. I. M. D. Little and Mr. F. Seton for invaluable comments.

consistent way by past economic events, which can be adequately described by past levels of output, so that

$$C_t = \sum_{j=1}^{p} c_j Y_{t-j} + \epsilon_t$$

where ϵ_t is an error term. It will be assumed that investment decisions are made with two considerations in mind. First, investment policy is influenced by expectations, founded on past levels of output, which point to trends in demand, and that this component is

$$I_t' = h_1 Y_{t-1} + \ldots + h_q Y_{t-q} + \eta_t$$

Secondly, investment is influenced by levels of excess capacity (reflecting increasing costs, delays and breakdowns), and that such a component takes the form

$$I_t'' = k_1(a_1 Y_{t-1} - b_1 K_{t-1}) + \ldots + k_r(a_r Y_{t-r} - b_r K_{t-r}) + \zeta_t$$

Thus total investment is related to past levels of output and capacity by an expression of the form

$$I_t = \sum_{j=1}^{q_1} \alpha_j Y_{t-j} + \sum_{k=1}^{q_2} \beta_k K_{t-k} + \theta_t$$

The assumptions, despite their apparent generality, lead to too consistent a decision structure. As has already been noted, some events leave stronger impressions than others. In the case of investment in particular, two basic considerations have been suggested. But why should entrepreneurs always give them the same relative weight? Should not the economy be considered as having some type of indifference map between the demand and capacity motives? If so, then there is no reason to suppose that the contours of this map be straight lines, as has been assumed above. However, to introduce non-linear investment decisions at this stage would complicate the analysis enormously. The results of dropping the linearity assumptions are explored later.

From the equations above it is possible to obtain the general linear multiplier–accelerator model:

$$\begin{cases} Y_t = I_t + C_t \\ I_t = \sum_{j=1}^{q_1} \alpha_j Y_{t-j} + \sum_{i=1}^{q_2} \beta_i K_{t-i} + \theta_t \\ C_t = \sum_{j=1}^{p} C_j Y_{t-j} + \epsilon_t \end{cases}$$

which reduce to a relation of the form

$$Y_t + a_1 Y_{t-1} + a_2 Y_{t-2} + \ldots + a_s Y_{t-s} = A_t$$

where A_t is an error term.

The most general solution is of the form

$$Y_t = \sum_{j=1}^{s} g_j \lambda_j^t + L_t(A_t, \ldots A_{s+1})$$

where λ_j are the roots of the auxiliary equation, $\lambda^s + a_1\lambda^{s-1} + \ldots + a_s = 0$, and the g_j are determined by initial conditions, $Y_t = Y_t^0$, $t = 1, 2, \ldots s$. The expression $L_t(A_t, \ldots A_{s+1})$ will be termed the exogenous component, as opposed to the other, $\sum_{j=1}^{s} g_j\lambda_j^t$, which can be termed the endogenous one. The form of $L_t(A_t, \ldots A_{s+1})$ can be obtained in the following way:

The recurrence relation can be written in the form

$$(1 + a_1E^{-1} + a_2E^{-2} + \ldots + a_sE^{-s})Y_t = A_t$$

where $EY_t = Y_{t+1}$

$$\therefore\ Y_t = [\prod_{j=1}^{s}(1 - E^{-1}\lambda_j)^{-1}]A_t$$

$$= [\prod_{j=1}^{s}(1 + \lambda_jE^{-1} + \lambda_j^2E^{-2} + \ldots)]A_t$$

$$\text{so,}\quad L_t = A_t + (\Sigma\lambda_j)A_{t-1} + \ldots + S_{t-j}A_j + \ldots S_{t-s-1}A_{s+1}$$

where S_{t-j} is a homogeneous symmetrical expression of degree j in λ_t. This implies that the exogeneous path's individual bumps grow at a rate comparable to that of the rest of the system, either dying away when the fluctuations are damped, or growing when there is an endogenous growth rate, *i.e.*, when there is a real, greater than unity, root of the auxiliary equation.

The roots of the auxiliary equation can be separated into three groups. First, that including all real, positive roots greater than or equal to unity; secondly, that with all roots of less than unit modulus and, lastly, a group containing all complex and negative roots with modulus greater than or equal to unity. The endogenous path is thereby divided into three components, the first of which grows steadily, the second has damped oscillations and the third which explodes into ever increasing cycles.

What does all this imply?

A decision structure with all the roots of its auxiliary equation of less than unit modulus has an output path in which growth forces must come from outside, if they are to exist at all. The initial conditions then become unimportant as the endogenous path dies away, and both fluctuations and growth become attributable to random bumps. This is not very helpful to the economic interpretation of trade cycles, for to analyse them would demand excusions into politics, sociology and the like.

Should the auxiliary equation have roots of greater than unit modulus, provided the largest be real and positive, the endogenous forces of the

system will set up a growth path, and fluctuations will, in time, become less and less important. In such cases the autonomous component will grow at the same rate, and any positive bumps to the system will contribute to the ever-expanding output.

The exogenous bumps cannot influence the rates of growth of the system unless they have their own secular trend, or induce changes in the decision structure. This latter possibility could be accommodated by allowing discrete changes in the decision structure over time, but for theoretical purposes the work would become too cumbersome.

Linear dependence of consumption and investment demands on past levels of economic variables allows separate study of the endogenous path's three components, and an independent consideration of the exogenous forces. (This assumes the system reduces to a recurrence relation.) Such further allows superposition of cycles on the exogenous growth trends, as was examined in Hicks' *Trade Cycle* contribution [3].

Naturally enough, questions of counteraction of cycles arise. Every A_t could be compensated by an equal and opposite effect imposed by the Government, and unwanted cycles could be eliminated similarly, even though they be endogenously created. But who will be able to foretell the size of an A_t? And secondly, the theory implies that any mistake will be multiplied in the same way as any bump. Another way of avoiding fluctuations would be to change the decision structure, and hence the rates of growth possible therefrom. Such would necessitate a study of the relation between the decision structure and its growth rates, and is beyond the scope of this article.

Non-linear Hypotheses

Besides the drawbacks already mentioned, what has not been taken into account? What about elasticities of expectations, elasticities of supply and demand with respect to output, all of which depend either on the rate of growth of output or absolute levels of output over time?

Given that coefficients change, how can they vary with time? In the first place they can change in a random fashion about some supposed mean. For this, the analysis used so far could be used to examine expected levels of output. But there are difficulties. From statistical theory, it is known that the expected value of the product of two variates is not the product of their expected values, unless the two be mutually independent. Thus, it must be assumed that in such a model the relations are linear and the coefficients are independent of the variables. This is then not strictly a non-linear case. Secondly, the coefficients might change according to some temporal law, that is be a function of time. As with differential equations, the method would be to try a series solution.[1] Finally, the

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coefficients may depend on past levels of economic variables. In this case the recurrence relations will no longer be linear, and the analysis used so far will not apply. The implications of such hypotheses will now be examined.

Suppose the assumptions reduce to a recurrence relation of the form

$$f(Y_t, \ldots Y_{t-s}) = 0 \quad \ldots \quad (1)$$

where this is a polynomial expression, obtained after fractions and roots have been multiplied up or worked out.

Denoting by $H_k = H_k[Y_t, \ldots Y_{t-s}]$ a homogeneous expression of degree k in the levels of output, equation (1) can be written in the form

$$H_m + H_{m-1} + \ldots + H_1 + H_0 = 0 \quad \ldots \quad (2)$$

Try an output path of the form $A\lambda^t$. Then, for this to satisfy (1)

$$H_m[A\lambda^t, A\lambda^{t-1}, \ldots A\lambda^{t-s}] + H_{m-1}[A\lambda^t, \ldots] + \ldots + H_0[\ldots] = 0$$

Remembering that the homogeneity property implies

$$H_k = (Y_{t-s})^k \cdot H_k\left[\frac{Y_t}{Y_{t-s}}, \frac{Y_{t-1}}{Y_{t-s}}, \ldots 1\right]$$

(2) can be written in the form

$$(A\lambda^{t-s})^m H_m[\lambda^s, \ldots 1] + (A\lambda^{t-s})^{m-1} H_{m-1}[\lambda^s, \ldots 1] + \ldots + H_0[\lambda^s, \ldots 1] = 0 \quad (3)$$

Thus for $A\lambda^t$ to be a solution of (1), (3) must hold identically for all t. The functions $H_k(\lambda^s, \ldots 1)$ are independent of time, so that (3) is a polynomial in the variable $(A\lambda^{t-s})$ and can be identically zero for all t only if the coefficients of the $(A\lambda^{t-s})^j$ vanish. This implies that for $A\lambda^t$ to be a solution of (1) λ must satisfy

$$H_j(\lambda_s, \ldots 1) = 0, \; j = 0, \ldots m-1, m$$

In general, this is obviously not true, for the H_j are not necessarily related to one another in the form that their having a common root would suggest. Hence it follows that a constant proportional-growth path cannot in general satisfy a recurrence relation of degree greater than one.

In most cases Y_t will be soluble in terms of its predecessors. In such circumstances numerical values can be given to the coefficients and a solution found using a computer. This, it seems, is the direction in which any further advance in this theory will have to be made.

Evolve reasonable hypotheses, with variable coefficients. Compute the path for given values of the parameters. This will set up a relationship between the vector of parameters and the output path. Whence, there are two procedures: either the model can be used for prediction, having

obtained estimates for the model's parameters, or by studying the relation between the path and the various values of the parameter vector some remarks might be made about the form of path resulting from the particular assumptions chosen.

Returning to the above discussion, it is seen there are conditions under which $A\lambda^t$ satisfies (1), namely when (1) reduces to a homogeneous expression. Say, $f(Y_t, \ldots Y_{t-s})$ reduces to $H_k(Y_t, \ldots Y_{t-s})$ then, any λ satisfying

$$H_k[\lambda^t, \ldots 1] = 0$$

will provide a solution of (1), in the form $A\lambda^t$.

Thus if the original recurrence relation is in fact a homogeneous polynomial (that is with no fractions or roots), there are at least s and at most ks possible output paths of the form $A\lambda^t$. Unfortunately the group of solutions is no longer additive, as they were in the linear case, although it is possible, depending on the initial conditions, for the system to follow one of these particular paths. The main setback is that, in this non-linear case, there is no mathematical technique whereby one can build up the general type of path from particular cases. In other words, in the linear case the solution could be generalised by considering a weighted average of the particular solutions, and in the non-linear case this is no longer true.

While such may seem but an esoteric mathematical fact, it has important connotations for the economist. The components of a linear model's output path (exogenous or endogenous, cyclical, explosive or growing) could be considered separately. In the non-linear case this is impossible. Hence it appears that under non-linear decision structures there is no theoretical reason for growth and cycles to be independent, as is taken for granted in much of the literature.

It would seem to follow as a corollary, that only if such linear relations are empirically plausible can the problem of growth and cycles be divorced. That is, only in a free economy, with a linear decision structure, can cycles be countered without radically affecting the possible growth rates of the output path. In the non-linear case counteraction of cycles and fluctuations may affect growth and lead to instability. (See Appendix.)

Conclusion in Unisectoral Case

The generalised linear models differ from the simpler Samuelson–Hicks two-lag models [3, 5] in that they allow co-existence of growth and cycles in the short and medium run: this being impossible in the two-lag models. In the long run, however many lags there are, the endogenous path either follows a steady growth path or stagnates, assuming that explosive cycles are countered. This suggests, also, that for a detailed study of growth and fluctuations produced by accelerator-type decision structures one need not go beyond three, four or five lags. One further important result was that

bumps to the system, brought about by exogenous forces, were absorbed and grew at the same rates as the endogenous component.

Extension to non-linear structures is not particularly illuminating with recurrence relation techniques, except possibly in the homogeneous case. There advance seems possible only with the help of computers.

Part II. The Multisectoral Case

The analysis will now be extended to a multisectoral economy. Define a sector as an agglomeration of perfectly competing units, producing perfectly substitutable products. The closed economy considered is composed of an arbitrary number of sectors whose products are not substitutable one for another in any way.

It should be reaffirmed that the main aim is to study the result of assuming that everything in the present depends in some consistent way on the past level of economic variables. This is an important class of assumptions in economics, and it is intended to discover what conclusions this leads to in the multisectoral case, and find where mathematical frontiers prohibit further extension.

Much of this work is inspired by the Goodwin–Chipman models [1, 2] which operate with receipt vectors measured in monetary units, and not with output vectors in real terms as have been considered in the previous part. It is immaterial which approach be chosen, as they are two ways of expressing the same thing. Receipts of one sector are equivalent to its output, and plans depending on receipts and money flows will be the same as those depending on input and output, provided money illusion, price changes, bad debts and such be ignored.

The Multiplier

Starting with this simple case and giving a brief résumé of the work done by Chipman [1] and Goodwin [2], one can then proceed to extend their work. Denote by Y_t^j the output (receipts) of the jth sector in period t. The Chipman model has two postulates [1, p. 17].

> (i) "Each sector's disbursements (demands for goods) to every other sector are a given linear function of its receipts (output)."
> (ii) "Changes in the disbursements (demands for goods) follow changes in receipts (output) after a specified time lag."

Let b_t^{ij} be a spontaneous injection (continuing here with the Chipman terminology) from the jth sector to the ith in the tth periods: that is, this amount of spending is unrelated to receipts of the jth sector in the previous period. It can be interpreted either as investment demands of the jth sector, satisfied by purchases in the ith, just plain monetary investment by

the jth sector in the ith, or simply a temporary change in the disbursements pattern. The hypotheses can be interpreted symbolically as follows,

$$Y_i^t = \sum_{j=1}^{n} a_{ij} Y_i^j + \sum_j b_i^{tj}$$

or in matrix form:

$$Y_t = AY_{t-1} + b_t \qquad (1)$$

It is the total of the injections into the ith sector which is significant not the individual injections themselves. The a_{ij} represent the marginal propensities of the jth sector to spend in the ith, so that a unit increase in the receipts of the jth sector will, in the subsequent period, lead to an increase of spending of the jth in the ith sector to the tune of a_{ij}. This will in turn lead to an increase of spending of amount $a_{ki}a_{ij}$ in the kth sector by the ith, in the period after. So the effects will spread.

If $b_t = b$, a constant for all t, Goodwin has shown

$$Y_t = [I - A]^{-1}b - A^t[I - A]^{-1}b$$

The system might then be described as stable if $|A^t| \to 0$.

Various criteria have been set up for the convergence of A^t. Possibly one of the most useful is that of Waugh [8]. This suggests that if the propensity to spend of every sector be less than unity the system will tend to a position of eventual equilibrium at $[I - A]^{-1}b$. The formal equivalent of this is that $\sum_i a_{ij} < 1$ for all sectors.

An extension of this was made by Solow [6], who suggested:

> "If A be a non-negative matrix none of whose columns sums is greater than one, and at least one of whose column sums is less than one, then all the characteristic roots of A have modulus less than unity."

This can be interpreted economically as saying that at least one of the sectors must have a strictly positive propensity to save, and none should have a negative one.

These results fit in with those of the last section. There, stability depended on the marginal propensity to spend of the whole economy being less than unity, a condition which is obviously upheld if no sector has a propensity greater than unity, and at least one has a positive propensity to save. Given a common unit to measure outputs, the Solow conditions imply stability of the economy as a whole. However, there is no reason to suppose that the converse is true, *i.e.*, that stability for the economy as a whole implies stability in the multisectoral case. In the homogeneous model one sector could conceivably compensate for the profligacy of another, but the conditions set out by Solow and Waugh will not allow this.

Returning from this digression, there are further results which should be shown in connection with the dynamic multiplier. If b be not constant, then the solution to equation (1) of this section is, with $b_t = b + \Delta b_t$,

$$Y_t = A^{t-1}\Delta b_1 + A^{t-2}\Delta b_2 + \ldots + A\Delta b_{t-1} + \Delta b_t + [I - A]^{-1}b$$

which may be written in the form

$$Y_t = L_t(\Delta b_1, \ldots \Delta b_t) + [I - A]^{-1}b$$

The change of income between period $t - 1$ and period t is seen to be

$$Y_t - Y_{t-1} = (\Delta b_t - \Delta b_{t-1}) + A(\Delta b_{t-1} - \Delta b_{t-2}) + \ldots + A^{t-2}(\Delta b_2 - \Delta b_1) + A^{t-1}\Delta b_1$$

So that if injections do not decrease over time the income (output) vector will grow monotonically, as the elements of A are all non-negative. Under any other conditions oscillations are likely to appear.

If H be such that $A = H^{-1}DH$,

$$L_t = H^{-1}[D^0(H \cdot \Delta b_t) + \ldots + D^{t-1}(H \cdot \Delta b_1)] \quad . \quad . \quad (2)$$

where D is the diagonal matrix of A's characteristic roots $\lambda_1, \ldots \lambda_n$, which will for simplicity be taken as distinct. But $D^t = \text{diag.}\,[\lambda_1^t \ldots \lambda_n^t]$, whence it follows that the coefficient of Δb_k is of degree $t - k$ in the λ_i. If all the λ_i have less than unit modulus, which is true if the Solow conditions hold, the term $L_t(L_t)$ approximates to the first few terms of the right-hand side of (2).

Another more interesting amendment can be made to the Chipman analysis. In trying to eliminate his second postulate, which was that the lags between receipts and disbursements were the same for all sectors, Chipman allows himself a clever, but rather too sophisticated a trick. Let all the money flows have the same lag, except for that between the ith and jth sectors. Assume that the lag there is twice as long as the others. By calling on a sector i', money can be taken to flow from i to i' in one period, and out of i' into j in the next. This extra distance for the (i, j) flow now reduces the whole problem to one in which all the time lags are the same. Obviously, the general case comes by introducing more and more bogus sectors, till all the lags are the same. Ingenious though such a dodge be, it is unsatisfactory having such sectors with no economic significance.

This difficulty can be avoided quite simply. Find that time period which divides all the system's lags, and take this as the basic period. (That there be one seems reasonable enough.) Now reformulate the hypotheses in the following way:

$$Y_t^j = a_{j1}Y^1_{t-r_{j_1}} + a_{j2}Y^2_{t-r_{j_2}} + \ldots + a_{jn}Y^n_{t-r_{j_n}} + b^j$$

where r_{jk} is the number of basic periods' lag between the kth sector's

receipts and its disbursements to the jth. In matrix form this would appear as

$$Y_t = A_1 Y_{t-1} + \ldots + A_s Y_{t-s} + b$$

where $s = \max_{ij}(r_{ij})$. There is no reason why the various A_j should be non-singular; in fact, it is quite likely that some will have only one non-zero entry.

The solution of this recurrence relation is somewhat ahead of the present state of the analysis, but the result, only quoted here, will be proved later. It is found that

$$Y_t = \lambda_1^t M_1 k_1 + \ldots + \lambda_{ns}^t M_{ns} k_{ns} + [I - (A_1 + \ldots + A_s)]^{-1} b$$

where the λ_i are the roots of the equation

$$\| \lambda^s I - A_1 \lambda^{s-1} - \ldots - A_s \| = 0$$

Extra fluctuations are introduced because of the lags. Mr. D. G. Champernowne has shown that the "characteristic" roots of this system must have less than unit modulus. Hence the system, even with the extended assumptions, is stable. Intuitively one might say that every unit of random spending generates less spending at the next "round," so that instability could not arise.

The Accelerator

Chipman goes one stage farther than Goodwin, and in his last chapter suggests how money-flow analysis can be extended to deal with the multi-sectoral version of the Hicks–Samuelson model [1, p. 140]. Such a step seems a natural consequence of what has gone before, once one asks what determines the injection levels. It is certainly reasonable to suppose that there is some relation between the size of the injection and the increase in the receipts of the spending sector. Formally this would be written as

$$b_i^{(t)} = \beta_{ij}(Y_{t-1}^{j} - Y_{t-2}^{j})$$

or in matrix form:

$$[\sum_j b_i^{(t)}] = \beta(Y_{t-1} - Y_{t-2})$$

It is important to realise that the formal analysis is unchanged if the expenditure of one sector be made to depend not only on its own changes in receipts but also those of other sectors. Suppose expenditure by the jth sector on goods from the ith depends on the level of income of each sector in the past period. (This is plausible, as investment plans of any one entrepreneur are influenced by that is happening throughout the economy.) Or, what amounts to the same thing, receipts of the ith sector from the jth depend on some, say linear, expression of outputs of the past period. Hence, adding for all sectors and letting j run from 1 up to n, the total receipts of the ith will also be a linear expression of the receipts of the previous period.

This linear relation therefore holds whether it be assumed that the expenditure of the jth depend only on the jth sector's past receipts, or the past receipts of all sectors.

The recurrence relation between the receipts of three consecutive periods is $Y_t = AY_{t-1} + B(Y_{t-1} - Y_{t-2}) + \epsilon_t$, where ϵ_t is an error term. As will be seen the solution to this equation is

$$Y_t = \lambda_1^t N_1 k_1 + \ldots + \lambda_{2n}^t N_{2n} k_{2n} + [I - A]^{-1}\epsilon$$

where $\epsilon = \epsilon_t$, the k_i are arbitrary constants, N_i are column vectors and λ_i are the $2n$ solutions of the equation

$$\| \lambda^2 I - (A + B)\lambda + B \| = 0$$

The General Multisectoral Model

There is no reason to suppose that investment and consumption depend solely on output of the past two periods. Investment, as suggested in the first part, will be influenced not only by past levels of output but also by past levels of excess capacity. Consumption also will depend on the trend of output over some definite experience span.

The output of the ith sector in the tth period will be distributed between total consumption and investment demands of all sectors. The demand by the jth sector for the ith's product will depend on the jth sector's past experience, and how it uses this to interpret the observed changes in output and excess capacity both in itself and in other sectors. It will be assumed that the jth sector will calculate how much to invest and how much to produce sufficient output to cater for the expected demand. As said in the first part supply constraints are ignored.

Had one tried the alternative of relating outputs of each sector to their inputs, one would have had to introduce technological relationships explicitly. This has been avoided here by concentrating on the distribution of outputs.

Suppose C_t^{ij} and I_t^{ij} be respectively the jth sector's demand for inputs, and for additions to its capital stock from the ith sector in period t.

I_t^{ij} will depend on changes in the level of output of all sectors within a certain time horizon, as well as changes in capacity during a similar period, which may or may not be of the same duration. Formally this means:

$$I_t^{(ij)} = \begin{cases} \alpha_{11}^{(ij)} Y_{t-1}^{\,1} + \alpha_{12}^{(ij)} Y_{t-1}^{\,2} + \ldots \\ \vdots \\ \alpha_{s1}^{(ij)} Y_{t-s}^{\,1} + \ldots + \alpha_{sn}^{(ij)} Y_{t-s}^{\,n} \end{cases}$$

$$+ \begin{cases} [\beta_{11}^{(ij)} Y_{t-1}^{\,1} - \gamma_{11}^{(ij)} K_{t-1}^{\,1}] + \ldots \\ \vdots \\ [\beta_{r1}^{(ij)} Y_{t-r}^{\,1} - \gamma_{r1}^{(ij)} K_{t-r}^{\,1}] + \ldots + [\beta_{rn}^{(ij)} Y_{t-r}^{\,n} - \gamma_{rn}^{(ij)} K_{t-r}^{\,n}]. \end{cases}$$

The total demand for the product of ith, going as investment is $\sum_j I_i^{(j)}$ and so will also be of the above form. In matrix notation I_t is given by

$$I_t = A_1 Y_{t-1} + \ldots + A_s Y_{t-s} + (B_1 Y_{t-1} - C_1 K_{t-1}) + \ldots + (B_r Y_{t-r} - C_r K_{t-r})$$

where A_j, B_k, C_l are constant matrices.

This expression can be written in the form

$$I_t = \sum_{i=1}^{p} A_i Y_{t-i} + \sum_{j=1}^{q} B_j K_{t-j} \quad \ldots \quad (1)$$

A similar analysis holds for consumption goods' demand, producing a relation

$$C_t = D_1 Y_{t-1} + \ldots + D_w Y_{t-w} \quad \ldots \quad (2)$$

Again remembering that total supply is elastic, the level of output is given by

$$Y_t = C_t + I_t \quad \ldots \quad (3)$$

The three equations reduce to a relation of the form

$$Y_t + P_1 Y_{t-1} + \ldots + P_s Y_{t-s} = A_t$$

A_t a stochastic term. This form has already appeared twice in this part of the article, first in relaxing Chipman's second postulate and secondly in the case of the accelerator. This recurrence relation is the multisectoral generalisation of the multiplier–accelerator model.

First solve the equation

$$0 = Y_t + P_1 Y_{t-1} + \ldots + P_s Y_{t-s} \quad \ldots \quad (4)$$

Try a solution of the form $\Lambda^t M$, where $\Lambda = \lambda I$ and M is an arbitrary column vector. For this to be a solution

$$\Lambda^t M + P_1 \Lambda^{t-1} M + \ldots + P_s \Lambda^{t-s} M = 0$$

in other words

$$\lambda^{t-s} [\lambda^s I + P_1 \lambda^{s-1} + \ldots + P_s] M = 0$$

Hence, as this must be true for all values of t, $[F(\lambda)]M = 0$, where

$$[F(\lambda)] = [\lambda^s I + P_1 \lambda^{s-1} + \ldots + P_s]$$

But for any $[F(\lambda)]$, $[F(\lambda)] \,.\, \text{adj.}\, [F(\lambda)] = \| F(\lambda) \| \,.\, I$ holds identically. Hence $\lambda^t M k$ is a solution of (4), if

(a) λ satisfy

$$\| F(\lambda) \| = 0 \quad \ldots \quad (5)$$

(b) M be a column vector of the matrix adj. $[F(\lambda)]$; and

(c) k is an arbitrary scalar multiple, determined by the initial conditions.

As there are ns solutions to (5), the general solution of (4) must be

$$Y_t = \lambda_1{}^t M_1 k_1 + \ldots \lambda_{ns}{}^t M_{ns} k_{ns}$$

with M_i a column of the matrix adj. $[F(\lambda_i)]$ and λ_i the roots of (5).

If the initial conditions be

$$Y_t = Y_t{}^0, \quad t = 1, 2, \ldots s$$

it must follow that

$$\begin{bmatrix} Y_1{}^0 \\ \vdots \\ Y_s{}^0 \end{bmatrix} = \begin{bmatrix} \lambda_1 M_1, \lambda_2 M_2, \ldots \\ \lambda_1{}^s M_1, \ldots \lambda_{ns}{}^s M_{ns} \end{bmatrix} \begin{bmatrix} k_1 \\ \vdots \\ k_{ns} \end{bmatrix}$$

giving

$$\begin{bmatrix} k_1 \\ \vdots \\ k_{ns} \end{bmatrix} = \begin{bmatrix} \lambda_1 M_1 & & \\ & \ddots & \\ & & \lambda_{ns}{}^s M_{ns} \end{bmatrix}^{-1} \begin{bmatrix} Y_1{}^0 \\ \vdots \\ Y_s{}^0 \end{bmatrix}$$

Now consider the solution of

$$Y_t + P_1 Y_{t-1} + \ldots + P_s Y_{t-s} = A_t \quad \ldots \quad (6)$$

with initial conditions as in the last example. If Y_t be the solution just considered, for $Y_t{}^*$ any solution of (6), $Y_t + Y_t{}^*$ is also a solution of (6). As Y_t satisfies the initial conditions, $Y_t{}^*$ must be a solution of (6), which is zero for the first s periods. Then certainly, $Y_{s+1}{}^* = A_{s+1}$.

From (6), $Y_t{}^*$ is a linear function of the A's if its predecessors are. But it has been seen that this is true for all periods before $s + 2$, hence it follows by induction that $Y_t{}^*$ is a linear function of the A's.

Thus the general solution of (6) is

$$Y_t = \sum_{i=1}^{ns} \lambda_i{}^t M_i k_i + Y_t{}^*$$

where $Y_t{}^*$ is some linear function of the stochastic terms. Further, it will be presumed, though not proved here, that the term $Y_t{}^*$ of this solution is an expression in which the coefficient of A_{t-j} is of degree j in the λ_i as in the unisectoral case.

From the form of the general solution, it is clear that the discussion of the properties of the path in the linear model apply here. The type of output path obtained is exactly the same, and the relations between the exogenous and endogenous components still hold in this the multisectoral case. Nor is there any reason to suppose that all the λ_i have less than unit modulus, so that steady growth is quite possible with accelerator-type assumptions.

Something should be said about the non-constant coefficients. If Y_t can be solved in terms of its predecessors straightforward computation would produce a solution. But in some respects this is shelving the task set,

which was to see just what conclusion general-recurrence-relations techniques would say about growth and cycle models.

In linear unisectoral models all variables and parameters, being scalar, were commutable. This property is not retained once the model moves into a multisectoral world. When linearity is dropped the additivity of particular solutions also disappears. This means a solution of the form $\lambda^t M$ cannot be tried, let alone

$$\lambda^t M + L_t(A_t, \ldots, A_s)$$

Say, for example, a term of the form $Y_t PY'_{t-j}A + Y_t QY'_{t-k}B$ arose: substituting

$$Y_t = \lambda^t M$$

gives

$$\lambda^{2t-j} MPM'A + \lambda^{2t-k} MQM'B$$

Whence it appears that the value of λ would depend on the M chosen. Thus the only possible solution in this conventional form would be $Y_t = \lambda^t$, which is too restrictive to be interesting.

As far as general economic theory is concerned, it is not worth while pushing the general polynomial relation in multisectoral analysis any further. This does not mean that useful results cannot be found in particular cases [*vide* 7]. Sectoral models with constant coefficients definitely lead somewhere, but the consideration of non-constant coefficients is possibly better treated, if at all, in the unisectoral model, where computation and theory are easier.

Conclusions

The primary interest has been the generalisation of the Samuelson–Hicks multiplier–accelerator model to any number of sectors and any number of time lags. Piece-meal extensions made are useless without some appreciation of the form and limits of the conclusions, to which the theoretician is necessarily restricted by his mode of analysis. A sally into generalisation is like the aerial reconnaissance of a jungle prior to exploration on foot. It is never really worth while striking out at random from an arbitrary point. Far better is it, to gain first some idea of what is hidden in its depths, then to decide calmly on the best and most efficient way of finding it before setting off.

Our mode of transport has been recurrence relations, and it has been shown how they, in their general form, can be used to further economic thinking by suggesting the types of paths attainable under accelerator assumptions. That is, it has been possible to examine the implications of the assumption that variables' present values depend on their past values.

Extending the analysis to a multisectoral system does not give an output path radically different from that in one-sector models. The difference lies

in that growth rates are created not only by time lags, as in the homogeneous case, but also by structural interdependence of the sectors. This was seen from the extra growth rates that appear as soon as individual sectors were introduced—as the sectors take account of each others levels of output when reaching their own investment and consumption decisions. Extension to a non-linear decision structure provides unmanageable relations in general. But, as in the Samuelson–Solow article [7] on homogeneous production functions of the first degree, there have been particular break-throughs. Even there no general solutions were found, and the analysis was confined to studying the existence of a unique balanced-growth path.

The rates of growth were dependent on the decision structure. A change in the rates of growth would therefore need control, either of the exogenous forces through foreign investment or government spending, or a radical change in the decision structure by taxes or controls. The hows and wherefores of the latter manipulations are a matter for more detailed analysis, requiring some new results, such as an extension of Frobenius' theorem, which would relate changes in the solution of greatest modulus to changes in the coefficients of

$$\| \lambda^s I + P_1 \lambda^{s-1} + \ldots + P_s \| = 0$$

Having worked here with a general solution, one should now consider particular cases: for example, a three-sector economy in which the experience span differs in each industry. How will this affect their growth rates and fluctuations in their output? Then again the field of application may be widened to include international trade, for example in the study of customs unions. Accelerator-type models have appeared in inflation theory, the general results would also apply there. The field of application is large, for the sort of assumption considered appears in most branches of economics. But as well as extending the field, there is much to be done now in considering special cases, both in the unisectoral and the multisectoral case.

It is no doubt a comfort to know that the generalised model yields nothing very different from the simpler two-, three- and four-lag models. Apart from this, the article has shown two things. First, one can be categorical, and not tentative, about conclusions to extensions of the pioneering article by Samuelson and understand where and why this more general analysis has limitations. Secondly, the article has shown that recurrence relation models can explain growth as well as cycles, so now one is better equipped to compare their potentialities with those of other models attempting to analyse change in output over time.

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Appendix

Stability

In the linear case, unisectoral or multisectoral, it was easy to counter unwanted fluctuations. But with a non-linear decision structure it is impossible to divorce the discussions of growth and fluctuations, so that in this case the problem of stability becomes important. In the static model stability is considered in relation to the steady state. The dynamic counterpart is to consider divergences between the path the system actually follows and that it would have followed had the disturbance not occurred. And, as has been suggested on p. 41, this type of analysis could be used to consider the effects of boosts and counter-cyclical impacts on the system.

Suppose the assumptions of the model reduce to a recurrence relation

$$F(Y_t, \ldots Y_{t-s}) = A_t \quad . \quad . \quad . \quad . \quad . \quad . \quad (1)$$

where Y_t is the path followed by the system under original conditions. Let the system now receive an additional jolt of δA_0 at time zero, and suppose the new path to be $Y_t + \delta_t$, where δ_t is the divergence from the path that the system would have followed had there been no disturbance.

The recurrence relation satisfied by δ_t will be

$$F(Y_t + \delta_t, \ldots Y_{t-s} + \delta_{t-s}) = A_t$$

Provided δA_0 be small compared with A_0, under conditions of stability δ_t will be small. Hence in cases of stability δ_t must satisfy

$$\delta_t \frac{\partial F}{\partial Y_t} + \ldots + \delta_{t-s} \frac{\partial F}{\partial Y_{t-s}} = 0$$

This is a recurrence relation in δ_t, with coefficients dependent on time, as Y_t is a function of time. If however, $\dfrac{\partial F}{\partial Y_{t-j}} \Big/ \dfrac{\partial F}{\partial Y_t}$ be independent of time (which is possible if $Y_t = A\lambda^t$ and the original recurrence relation be linear) and the equation

$$\lambda^s \frac{\partial F}{\partial Y_t} + \ldots + \frac{\partial F}{\partial Y_{t-s}} = 0 \quad . \quad . \quad . \quad . \quad . \quad (2)$$

have roots of modulus less than unity, it can be seen that the path Y_t is stable.

In the case of a linear decision structure the auxiliary equation of (1) and equation (2) are the same, so stability conditions then depend on the growth properties of the original path. But, as seen here, in more complicated cases the stability depends on a linear approximation to the system [see 4, p. 300]. The linear case can have interesting complications, for a system might have two endogenous growth rates g_1, g_2, of which only the first is operative, because of the particular form of the initial conditions. Should the system be jolted, it is feasible for the second to become operative. So that, if the second be the larger, the new path will gradually pull away from the old.[1] In such a case a latent growth rate has been realised and the model is strictly unstable. Further examples could be thought up.

There seems to be two possible concepts in growth path models: either

(i) " a path Y_t is stable if, after a small disturbance the new path $Y_t + \delta_t$ be such that $[\lim_{t \to \infty} L^t \ \delta_t / Y_t]$ remains bounded " [see 4, p. 333]; or

(ii) " a path Y_t is stable if after a small disturbance the new path $Y_t + \delta_t$ be such that $\delta_t \to 0$."

[1] I have to thank Mr. R. C. O. Matthews for this idea.

The first might be termed relative and second absolute stability. For growth models it appears that the former is the more useful and meaningful concept. But, it has to be admitted that the analysis of equation (1) just given deals only with the second, for in making the linear approximation to the system it is assumed that the quantities considered are small.

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AUTONOMOUS *vs.* INDUCED INVESTMENT: THE INTERRELATEDNESS OF PARAMETERS IN GROWTH MODELS

I. Introduction

Ever since the distinction was drawn between autonomous and acceleration-induced investment in dynamic models, critics have complained about the manner in which autonomous investment has been handled. These critics have noted that in contrast with the increase in productive capacity imputed to induced investment, autonomous investment has been treated as non-productive. In the words of Mr. Kaldor, in these models " (autonomous) investment does not generate productive capacity, (but is rather) like digging holes in the ground, or building Pyramids." [1]

Mr. Kaldor's remarks (and those of the others referred to in footnote 1) were directed at Professor Hicks' theory of the business cycle.[2] But as will be seen below, they also apply with equal force to the growth model of Sir Roy Harrod, upon which Professor Hicks admittedly drew so heavily.[3] In the recent work on economic growth by one of the present writers,[4] an attempt was made to rescue this treatment of autonomous investment by arguing that *ex definitione* (see below) autonomous investment, even when capacity-generating, does not require growth to render it economically justifiable. Hence, its capacity-creating effects could be ignored in a growth model (and *a fortiori* a cycle model as well). Autonomous investment could therefore be viewed purely as an absorber of saving, reducing the amount that had to be absorbed by acceleration-induced investment and thereby lowering the " warranted " or equilibrium growth rate associated with any given acceleration coefficient. Thus the apparently paradoxical conclusion was reached that, as between two otherwise identical economies (including identical saving propensities), the one with the higher rate of

[1] N. Kaldor, " Mr. Hicks on the Trade Cycle," Economic Journal, December 1951, p. 845. *Inter alia*, see also J. S. Duesenberry, " Hicks on the Trade Cycle," *Quarterly Journal of Economics*, August 1950, pp. 466–7; S. C. Tsiang, "Accelerator, Theory of the Firm and the Business Cycle," *ibid.*, August 1951, pp. 336–7; and J. Robinson, " The Model of an Expanding Economy," Economic Journal, March 1952, p. 42.

[2] J. R. Hicks, *A Contribution to the Theory of the Trade Cycle* (Oxford: Oxford University Press, 1950). For reasons that will become evident shortly, there same strictures apply to the work of R. M. Goodwin, particularly to his most recent model of the trade cycle: "A Model of Cyclical Growth," in *The Business Cycle in the Post-war World*, E. Lundberg, ed. (London: Macmillan and and Co., Ltd., 1955), especially pp. 212–13.

[3] See R. F. Harrod, "An Essay in Dynamic Theory," Economic Journal, March 1939, pp. 14–33; and *idem*, *Towards a Dynamic Economics* (London: Macmillan and Co., Ltd., 1949). It might be observed that the critical remarks apply to Harrod's model only when he adds autonomous investment to the model.

[4] D. Hamberg, *Economic Growth and Instability* (New York: W. W. Norton & Co., 1956), pp. 40–5 and *passim*.

autonomous investment would have the smaller equilibrium growth rate. In this treatment of autonomous investment the writer was following the lead of Messrs. Harrod, Hicks and others, but thought he had provided a sounder analytical basis for doing so.

In the present paper we wish to point out the appropriate modifications called for. A wholesale retraction of the earlier treatments of autonomous investment is *not* required, only a redress of an obvious imbalance. We believe it can be shown that neither side has been wholly correct or incorrect and that a compromise solution is in order.

To set certain definitional and conceptual problems straight, we shall begin by briefly retracing some well-trodden paths involving both the distinctions and parallels that have been drawn between autonomous and acceleration-induced investment. The object of this discussion will be to re-emphasise not only the analytical usefulness of this distinction but also to point out wherein these two components of investment are related. With this discussion as background, we can then proceed to the development of simple and familiar models that demonstrate more precisely the differences between, and the interrelatedness of, autonomous and induced investment. Although the latter part of the discussion will run in terms of growth models alone, the reader should have no difficulty in comprehending the nature of the appropriate adjustments called for in the cycle models of Messrs. Goodwin and Hicks (see footnote 2, p. 53 above).

II. Autonomous *vs.* Induced Investment

By acceleration-induced investment is usually meant capital outlays to produce incremental output of essentially old ("long" existent) types of goods, capital and consumer alike. These outlays are made in response to increases (realised or anticipated) in production that result in high marginal costs, strain on existing staff and capital stock, bottlenecks and delays, all of which combine to create pressure to expand the stock of capital and provide for a larger productive capacity. As such, acceleration-induced investment depends specifically on (real) income growth for its motivation and justification.

It is not necessary to assume for this category of investment that capital and output are always perfectly adjusted, and when they are not we get a "flexible" or non-linear acceleration coefficient. Since we shall be dealing with equilibrium growth models, however, we shall assume that perfect adjustment does exist. In these circumstances induced investment is determined by a linear accelerator, unmodified that is, by any terms denoting excess or deficient capacity.

In contrast with induced investment, the motivation of autonomous investment has nothing to do with the growth of output. To the extent that autonomous investment embraces innovational investment, it is undertaken

either to lower costs at prevailing levels of output or else to make possible the introduction of new products that, in the early stages of production, at least, are calculated to displace substitute commodities in consumer budgets. Innovational investment is thus conceived as autonomous, *i.e.*, independent of real income growth, in the sense that its anticipated profitability is fully consistent with existing or given income levels.

In addition to innovational investment, it is very probable that a considerable part of residential (and perhaps public utility) construction induced by population growth or migration must also be viewed as autonomous of income growth. Since residential construction comprises roughly a quarter of gross, and a third of net, investment—at least in the United States—this is clearly an important category of autonomous and total investment (even though by no means can all residential construction be attributed to population growth or migration alone).

Whether we lump all government spending together or attempt to divide it into consumption and investment spending, government "investment" must also be described as autonomous of income growth. However, this does not mean that government investment must be conceived as pure pyramid building or non-capacity creating. Government investment in such types of social overhead capital as water and sewerage works, roads and highways, hydro-electric projects, schools and even public (office) buildings obviously adds to the productive capacity of the economy. And clearly, government invests in these things in response to (or in expectation of) growth in demand for the services involved. But in contrast with private induced investment, such government investment need not be depressed by the fact that demand does not grow *pari passu* with the growth of capacity in the public sector. In fact, given the large indivisibilities characteristic of much social overhead capital as well as the time lags often involved in the growth of demand because of important structural changes in an expanding economy, government normally invests in such capital well in advance of growth in demand.

It is also true, of course, that private autonomous investment also generates productive capacity. With the recognition of this fact, the issue raised by Mr. Kaldor and others is joined. Contrary to the earlier treatments by Harrod, Hicks *et al.*, to the extent that the increased productive capacity resulting from private autonomous investment is competitive with that associated with induced investment, the latter is bound to be depressed. Thus, consumer product innovations may induce a change in consumer preferences, and hence a shift in the composition of aggregate demand away from other, substitute products; some part of existing capital stock will thereby be rendered idle. Cost-reducing improvements in production methods may permit the innovators to undersell their competitors, thereby creating excess capacity in the latter firms, and/or they may cause a shrinkage

in demand for the capital goods they displace in production, with the result that excess capacity arises in the firms producing the obsolete capital goods.

In either case a rise in output will induce less (net) investment than would be true in the absence of these autonomous innovational investments; the average value of the acceleration coefficient for the economy as a whole will be reduced by the destructive effects of the competing autonomous investment. Something of this sort must be what the critics of the use of autonomous investment have had in mind.

Nevertheless, it is not true, as the critics seem to imply, that all private autonomous investment must compete with existing capital elsewhere. That is to say, we must not infer from the discussion of the preceding paragraph that private autonomous investment must always bring about obsolescence or idleness on the part of old capital. For example, autonomous investment in housing and public utilities to take care of population migrations *might* be accompanied by idle capital in the areas from which the population moves, but not necessarily; such migrations might also raise the amount of capital used in the latter areas. In either case a rise in *total* investment seems indicated, since even depressive effects in the old areas are likely to be more than offset by stimuli to investment in the new ones.[1]

Also, in the case of cost-reducing innovations, the widespread existence of oligopoly and administered pricing should be sufficient as a reminder that such improvements need not lead to lower prices on the part of the innovators, and therefore to a loss of sales by their rivals.[2] Moreover, we must not overlook the fact that, for one reason or another, sometimes good, sometimes bad, the time-rate of diffusion of such innovations is often very slow, and that many firms often find it economical to continue investing in old techniques at the same time their competitors are adopting new ones.[3] It is important

[1] Contrary to common opinion, the same cannot be said of investment in housing and associated services designed to accommodate a growing population only. Although such investment may depend heavily on the rate of population growth and household formation as a source of initial motivation, it must nonetheless be considered "competitive" in character. Without income growth, the purchase of housing and associated services must involve a displacement of demand for other goods, and hence for the capital goods used to produce these goods.

[2] However, in this case, the profit share of income is raised; in turn, the overall saving ratio will tend to rise somewhat, because the saving rate out of profits is higher than the saving rate out of wages. However, if the cost-reducing innovation affects only one or two industries, the effect on overall income shares and saving propensities will be negligible. In any event, there will be a partial offset to the reduction in the "warranted" or equilibrium growth rate made possible by the absorption of saving by "non-competitive" autonomous investment.

To the extent that the cost-reducing innovations involved a reduction in unit labour costs, this case would also pose a threat of growing unemployment of labour, provided that autonomous investment itself fails to grow in proportion to income.

[3] In a recent informal symposium on projects related to the analysis of the research process, sponsored by the National Science Foundation on April 14 and 15, 1959, Edwin Mansfield, of Carnegie Institute of Technology, reported some interesting data on lags in the rate of diffusion of innovations. In the case of the continuous wide strip steel rolling mill, 25–30 months elapsed before even 50% of the steel firms adopted it; 12–15 *years* elapsed before 50% of the

to avoid romantic notions about the rate of obsolescence (or Schumpeter's "creative destruction") brought about by innovations.

Finally, it is necessary to note that little autonomous government investment, even when it surely generates additional productive capacity, has any destructive effects on existing capital in the private sector. Perhaps the construction of a hydro-electric dam by government might occasionally have some such effects on private electric utilities (or rather, might displace private investment in such projects). But ordinarily, government investment in such facilities as schools and public office buildings, water supply, sewage disposal, streets and highways, and even military installations cannot be said to result in obsolescence or idle capacity in the private sector. Certainly, to the extent that government *gives* away the services it provides, there can be no question of displacement of demand in the private sector.[1]

We must guard against the extreme inference from the acknowledged capacity creating effects of much of autonomous investment that such investment must *ipso facto* always destroy capital, and hence depress induced investment, elsewhere in the economy in proportion to the capacity that is does generate. Where Harrod, Hicks and others went to the one extreme of ignoring completely the potential destructive effects of autonomous investment, the critics seem to be implying (apart from "pyramid building") the opposite extreme. However, it is not necessary to choose between opposites; an intermediate or compromise position is not only desirable but more accurate as well.

Let us use the adjectives "competitive" and "non-competitive" to describe autonomous investment that is and is not, respectively, economically destructive of capital elsewhere. Then we may say that even when autonomous investment, public or private, does generate productive capacity, some may be competitive and some non-competitive. When it is competitive, then the value of the acceleration coefficient employed in growth (or cycle) models must be reduced in proportion to the capacity created by

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railroads had adopted the diesel locomotive; and to achieve the same adoption rate, it took 12 and 10 years for the by-product coke oven and continuous mining machine, respectively. In all cases, firms were continuing to invest heavily in the earlier methods of production at the same time that the new ones were being adopted by their competitors.

[1] It should be clear that we are assuming that the subsidy is financed from higher tax revenues accruing from income growth, a positive marginal propensity to tax, and a *given* tax-rate schedule. In this case, not only would government investment not lead to demand displacement in the private sector but the investment itself would have to increase in proportion to the growing tax receipts if a budget surplus, a higher saving ratio and hence a higher equilibrium growth rate were to be avoided. On the other hand, subsidisation of government services financed out of higher tax *rates* would displace demand in the private sector and render capital idle there. At the same time we do not, and cannot legitimately, assume that the subsidy is financed by a budget deficit, since the negative government saving would mean a lower aggregate saving rate, thereby changing the rules of the game; in these circumstances, of course, government investment would not be "competitive" simply because there would be less private investment as a result of the lower saving ratio.

the autonomous investment. When the latter is non-competitive no adjustment whatsoever in the accelerator is called for.

Before we proceed to the model building stage, one final and brief point should be made in connection with autonomous investment. Such (private) investment may be a function of income *level* in the sense that it often appears to be strongly synchronised with expansion (as opposed to contraction) phases of business cycles. In this sense it may be described as "timing-induced." Considerations of problems of credit availability and the positive relation between profits, business saving and national income suggest a possible functional relation of this sort. To the extent it is related to income level, autonomous investment can be built into a marginal propensity to invest ($\Delta I/\Delta Y$) and combined with the marginal propensity to consume to obtain the familiar marginal propensity to spend. No complications or changes of significance would result from the introduction of this factor in the ensuing analysis, from which it has been omitted, and exactly the same results would be obtained. The omission of such a relation stems from the belief that at best finance is primarily a permissive element only in investment decisions; hence, given the volatility of the other influences upon autonomous investment, the relation between finance and such (or any other kind of) investment is likely to be essentially non-linear. Autonomous investment may even decline in the face of rising income and profits.

III. The Interrelatedness of the Accelerator and Autonomous Investment in Growth Models

For reasons that will soon become apparent, we shall employ, side by side, both a Harrod and a Domar model in discussing the impact of autonomous investment upon equilibrium (or warranted) growth. Preliminary to this discussion, however, it will be helpful as an aid to the analysis if we first examine briefly these models without autonomous investment in the picture.

A. Growth Models without Autonomous Investment

We begin with the following lagless Harrod model of income determination:

$$Y_t = (1 - s)Y_t + v(Y_t - Y_{t-1}) \tag{1}$$

where s represents a long-run constant average (and marginal) propensity to save and v is the acceleration coefficient. The solution to (1) is:

$$Y_t = \left(1 + \frac{s}{v - s}\right)^t Y_0 \tag{2}$$

The equilibrium or warranted growth rate (G_w) is thus:

$$\frac{Y_t - Y_{t-1}}{Y_{t-1}} = G_w = \frac{s}{v - s} \tag{3}$$

This growth rate is an equilibrium one in the sense that, given the model specified by (1), it maintains equality between current spending and income or between planned saving and investment. For our purpose, the critical term in this model is the investment demand term in (1). Clearly, the coefficient v is a behaviour coefficient; it tells us that producers will react to an increase in income of $Y_t - Y_{t-1}$ by investing a sum of money equal to $v(Y_t - Y_{t-1})$ in additional capital stock. However, if $s/v = s$ is really to be an equilibrium growth rate, v must be more than simply a behaviour coefficient; it must also be the technical (marginal) capital coefficient. The reason is that consistency in spending plans is not a sufficient stipulation of equilibrium. The v that describes producers' investment reaction to income change must itself have a specific determinable value if the growth rate which maintains consistency in spending plans is also to maintain full utilisation of capacity. With no autonomous investment, the induced investment that producers make must be exactly the amount that the technical capital coefficient indicates is needed to provide the added capacity to increase (real) income by the amount $Y_t - Y_{t-1}$. If induced investment were greater or less than that indicated by the technical capital coefficient, excess or deficient capacity would eventuate, and $v(Y_t - Y_{t-1})$ would cease to represent the investment demand term in equation (1). Hence, if this term is indeed to depict investment behaviour, v must be the technical capital coefficient.

Under this condition, the Harrod model may be said to represent a complete growth model in the sense that equation (1) is not only the demand equation that its form apparently indicates it to be, but it is implicitly a kind of supply equation as well. That is to say, the warranted growth rate shown in (3) does more than maintain consistency in spending decisions; it also assures continuous full utilisation of the growing capital stock; in other words, it is a full-capacity growth rate as well.

To emphasise this, and to prepare us for the later discussion with autonomous investment included, let us briefly compare this Harrod model and its solution with a Domar model. The Domar-type model looks at the growth problem exclusively from the supply side of things, because it shows the growth of income and investment that is required by the capacity-creating effects of (net) investment, without postulating the determinants of investment. In this sense, it is a less-complete form of growth model than that of Harrod. To represent a Domar model, we may write:

$$(4) \qquad \begin{aligned} Y_t &= Y_{t-1} + oI_t; \quad (I_t = sY_t) \\ &= Y_{t-1} + osY_t \end{aligned}$$

where s is the same as in the Harrod model, and o is a productivity ratio that is the reciprocal of the technical (marginal) capital coefficient; *i.e.*, $o = \Delta Y/\Delta K$. oI_t is therefore the potential increase in output (that is, the increase in productive capacity) in period t associated with net investment, I,

in period t. We have abstracted from lags in the capacity-creating effects of investment in order to bring this Domar model as nearly into line as possible with the Harrod model of equation (1).

The solution to (4), like (1) a first-order difference equation, is:

$$Y_t = \left(1 + \frac{\sigma s}{1 - \sigma s}\right)^t Y_0 \tag{5}$$

The full-capacity, equilibrium (or " required ") growth rate, r, is thus:

$$\frac{Y_t - Y_{t-1}}{Y_{t-1}} = r = \frac{\sigma s}{1 - \sigma s} \tag{6}$$

This growth rate is unequivocally an equilibrium growth rate, for adherence to it will assure continuous full utilisation of the growing capacity inherent in each period's net investment, and this is surely the essential prerequisite of steady growth. For the Harrod warranted growth rate to be truly an equilibrium growth rate, $s/v - s$ must equal $\sigma s/1 - \sigma s$. Since s is the same in both models, this condition means that v must equal $1/\sigma$. That is, as we saw earlier, v must be the marginal value of the technical capital coefficient if the Harrod G_w is to be a full-capacity growth rate.[1]

In short, the Domar model specifies the full-capacity growth rate without specifying the determinants of investment, and hence the actual growth of income; the Harrod model specifies the determinants of investment and the actual growth of income without specifying the full-capacity growth rate. Only when the reaction coefficient v, which describes entrepreneurial investment behaviour, is equal to the technical capital coefficient $1/\sigma$, which stipulates the capacity consequences of investment, will the two growth rates be equality, and true dynamic equilibrium be attained. That is to say, if $v = 1/\sigma$, then the equality of saving and investment *ex ante* also means that realised investment is just the right amount needed to produce the increase in real income that actually occurs.

B. Growth Models with Autonomous Investment

Let us begin the discussion of the impact of autonomous investment on equilibrium growth by viewing the problem from the purely supply side of the picture first. We thus start with an elaboration of the Domar model given in equation (4) above:

$$Y_t = Y_{t-1} + \sigma(sY_t - \bar{I}_{ta}) \tag{7}$$

where the only new variable added to the earlier model is $\bar{I}_{ta}$, which stands

[1] Just in case it is not readily apparent that $s/v - s = \sigma s/1 - \sigma s$ when $v = 1/\sigma$, substitute $1/\sigma$ for v in $s/v - s$; thus:

$$\frac{s}{1/\sigma - s} = \frac{s}{\frac{1 - \sigma s}{\sigma}} = \frac{\sigma s}{1 - \sigma s}$$

for non-competing (the meaning of the subscript n) autonomous investment in period t. The solution to (7) is:

$$Y_t = \left(1 + \frac{\sigma s}{1 - \sigma s}\right)^t Y_0 - \sigma I_{tn} \tag{8}$$

The full-capacity or "required" growth rate, r, is thus:

$$\frac{Y_t - Y_{t-1}}{Y_{t-1}} = r = \frac{\sigma(s - I_{tn}/Y_{t-1})}{1 - \sigma s} \tag{9}$$

From (9) it is evident that the introduction of non-competing autonomous investment reduces the full capacity or equilibrium growth rate. Autonomous investment, we have seen, by definition needs no growth in aggregate output to inspire it. To the extent that it is non-competing, autonomous investment, even though it generates additional productive capacity, does not threaten existing capital with obsolescence or idleness. Hence, non-competing autonomous investment provides an outlet for saving that would otherwise have to be absorbed by investment that, for one reason or another, including the destructive effects of competitive autonomous investment, does require income growth to validate it. By doing this, non-competing autonomous investment reduces the growth of aggregate output needed for full capacity or equilibrium utilisation of the growing capital stock.

However, expression (9) also tells us that the introduction of even non-competing autonomous investment is not without its pit-falls. Assuming s and σ are relatively constant, this category of autonomous investment must evidently *grow* and do so at a rate proportionate to the growth in income itself if the equilibrium growth rate, r, is not to rise over time. The failure of I_{tn} to grow at the same proportionate rate as income would mean that the negative term in the numerator of the right-hand side of (9) would grow smaller as income rises over time, so that the residual s would rise over time, and consequently the entire expression $(=r)$ would also increase through time.

In order to make further use of this equilibrium growth model, especially by way of comparison with the Harrod model, it is necessary to rewrite (9) in such a way that it shows total autonomous investment, and not just the non-competing type alone. This is easily done by letting the ratio of total autonomous investment to national income, $I_t/Y_{t-1} = \theta$, and the ratio of non-competitive to total autonomous investment, $I_{tn}/I_t = \alpha$. Then $I_{tn}/Y_{t-1} = \theta\alpha$. Hence, by substitution, we can rewrite (9) as:

$$\frac{Y_t - Y_{t-1}}{Y_{t-1}} = r = \frac{\sigma(s - \theta\alpha)}{1 - \sigma s} \tag{10}$$

If the Domar model, without any behavior or demand equations, represents only the supply side of the growth problem, then we may inject demand into the picture in the form of the Harrod model, with its behaviour

equations, and autonomous investment added. The result is the *demand* equation:

$$Y_t = (1 - s)Y_t + v(Y_t - Y_{t-1}) + \bar{I}_t \tag{11}$$

The solution to (11) is:

$$Y_t = \left(1 + \frac{s}{v - s}\right)^t Y_0 - \frac{\bar{I}}{v - s} \tag{12}$$

The warranted growth rate, G_w, *i.e.*, the rate needed to maintain consistency in spending plans, or equality between planned saving and investment, is:[1]

$$\frac{Y_t - Y_{t-1}}{Y_{t-1}} = G_w = \frac{s - \bar{I}_t/Y_{t-1}}{v - s} = \frac{s - \theta}{v - s} \tag{13}$$

We know that in equilibrium, $G_w = r$, as these two growth rates have now been defined in expressions (10) and (13) with autonomous investment in the picture. That these two growth rates must be equal under equilibrium growth conditions stems from the fact that steady growth requires not only equality between planned saving and investment (Sir Roy Harrod's conditions) but also that planned and realised investment be just the right amount needed to permit the increases in output that actually take place, no more and no less. As earlier this means that the accelerator, v, must stand in a correct relation to o, the technical marginal ratio of output to capital. With autonomous investment now on the scene, however, no longer does $v = 1/o$, but instead $v < 1/o$, because part of the growing output can be met out of the increase in capital stock (or productive capacity) resulting from autonomous investment. Our problem, then, is to determine what the appropriate or equilibrium relation between v and o is in the presence of autonomous investment.

C. V, o and Autonomous Investment

If in equilibrium $G_w = r$, then we may proceed by setting (13) equal to (10):

$$\frac{s - \theta}{v - s} = \frac{o(s - \theta\alpha)}{1 - os} \tag{14}$$

[1] As a purely income generation or aggregate demand model, the lagless Harrod model of equation (11) yields the awkward result that the income level of (12) and the growth rate of (13) both vary positively with the (marginal and average) propensity to save, s. This situation could have been avoided by postulating one or more lags in the investment term of (11), thereby obtaining a second or higher order, in place of the first order, difference equation. Although multiple roots would result, income in such higher-order difference equations would tend to grow at the percentage rate given by the root with the largest modulus (*i.e.*, the rate given by the largest root), provided this root is real and greater than one in absolute value. This growth rate would also behave "properly" with respect to variations in s. To have introduced such additional lags into the demand side of the analysis, however, would have entailed the introduction of similar lags on the supply side (equation (7)) in order to keep the two sides comparable. The outcome would have been a much more complicated analysis that would have added little or nothing to the subject under discussion in the present paper.

Apropos of the earlier remarks about making autonomous investment a function of income level for finance reasons, if we let $\Delta\bar{I}_t/\Delta Y = i$, $\Delta\bar{I}_m/\Delta Y = i_m$, and $\alpha = i_m/i$, then the substitution of αi for $\alpha\theta$ in (10) and i for θ in (13) leads to the same results and analysis that follow below.

Solving for v, we get:

$$(15) \qquad v = \frac{s(\theta - \theta a)}{s - \theta a} + \frac{s - \theta}{o(s - \theta a)}$$

Now, holding s and o constant, we may vary a and θ to observe the effects of autonomous investment on v, the acceleration coefficient.[1]

Case 1. $\theta = 0$. Therefore $v = s/os = 1/o$. Consequently, in equilibrium $G_w = s/v - s = r = os/1 - os$. Since, these results are obviously the same as those obtained under Part A of this section, nothing more need be said. This case is included simply for the sake of completeness.

Case 2. $\theta > 0$, $a = 1$ (all autonomous investment non-competitive). In this case, again, $v = 1/o$ (except when $\theta = s$, in which case, and for obvious reasons, $v = 0$, and $G_w = r = 0$). With $v = 1/o$, in equilibrium $G_w = s - \theta/v - s = r = o(s - \theta)/1 - os$. Note that although $v = 1/o$ in both Cases 1 and 2, nonetheless the warranted and full-capacity growth rates are both lower in Case 2 than in Case 1. The reason is, of course, that a portion of total saving is being absorbed by autonomous investment that is non-competitive only and therefore destroys no capital elsewhere in such a way as to reduce v. Case 2 might be described as the Harrod Case, for it embodies the (implicit) assumptions set forth initially by Sir Roy Harrod and then built upon by Professors Hicks and Hamberg.[2]

Case 3. $\theta > 0$, $a = 0$ (all autonomous investment competitive). In this case, $v = \theta + s - \theta/os < 1/o$. Consequently, in equilibrium in this case, $G_w = s - \theta/v - s = r = os/1 - os$. The equilibrium or full-capacity growth rate, r, with autonomous investment entirely competitive, is exactly the same value as in Case 1, where zero autonomous investment was assumed. Even though G_w still equals $s - \theta/v - s$, therefore, the reduction in the (residual) saving rate by θ is fully offset by a reduction in v stemming from the completely competitive character of autonomous investment. Aggregate income and output must still grow at the rate $os/1 - os$ to absorb into production the added capacity resulting from the competitive autonomous investment. In other words, although $G_w = s - \theta/v - s$ remains the formal warranted growth rate, it is no less than $s/v - s$, because of the compensating fall in v. Unless v falls to the value indicated above, excess capacity will eventually emerge despite the growth of income at the rate that equates planned savings and planned investment, because this growth rate will be less than the indicated full-capacity growth rate, r. This case is ostensibly the one envisaged by the critics of autonomous investment.

[1] In this analysis we abstract from the effects of innovations on the numerical values of o and possibly v. Innovations in the aggregate may turn out to be capital saving or capital using, but since there is little evidence on this score, one way or the other, we shall go along with Sir Roy Harrod and assume them neutral in the aggregate in the sense of leaving the capital–output ratio unchanged. We also assume a constant rate of interest for the same purposes.

[2] See Harrod, "An Essay in Dynamic Theory," *op. cit.*, p. 27, third paragraph, and the earlier references to the work of Hicks and Hamberg in footnotes 2 and 4 on page 53.

Case 4. $\theta > 0$, $0 < a < 1$ (autonomous investment partly competitive and partly non-competitive). Therefore, v equals the full expression (15). This means that, as in Case 3, once again $v < 1/o$, but in this case v is larger than it is in Case 3, where all autonomous investment is assumed competitive. In equilibrium in this case $G_w = s - \theta/v - s = r = v(s - \theta a)/1 - os$. The θ in the r expression (the full-capacity growth rate) is only partially offset by the competitive component of autonomous investment, since in contrast with Case 3, part of autonomous investment is non-competitive.

Thus the full-capacity growth rate, r, is smaller in Case 4, with some non-competitive autonomous investment, than in Cases 1 and 3, with either no or else entirely competitive autonomous investment; but r is larger in Case 4 than in Case 2, with autonomous investment being entirely non-competitive. In all cases the rate of growth that equates planned saving and investment, *i.e.*, G_w, is $s - \theta/v - s$, but v changes with θ and a.

In both Cases 3 and 4 the accelerator, v, is lower than the reciprocal of the capital coefficient, $1/o$. So long as at least part of autonomous investment is competitive, the accelerator that is consistent with full equilibrium growth is less than the value of the marginal capital coefficient. Competitive autonomous investment will not be induced by income growth, but it must have income growth to justify itself or the competitive capacity it replaces; otherwise, the excess capacity will lead to reduced investment. Hence income growth is a necessary, but insufficient, condition for the maintenance of competitive autonomous investment at levels sufficient to ensure dynamic equilibrium. Income growth is both a necessary and sufficient condition for the maintenance of acceleration-induced investment (provided the Harrodian "natural" growth rate is not less than the warranted growth rate, and the rate of return is therefore kept from falling).

IV. Conclusions

A steady or equilibrium growth rate must fulfil two requirements (among others): (1) It must equate aggregate supply and demand or planned saving and investment (or, with no lag in the saving equation, as in equation (1) above, planned and realised investment). (2) An equilibrium growth rate must also guarantee full utilisation of the growing capital stock, *i.e.*, be a full-capacity growth rate. Although Harrod defined his warranted growth rate in terms of the first requirement only, we found that without autonomous investment present, G_w automatically satisfies the second requirement, too, because then v, a behavior coefficient, must also be the marginal technical capital coefficient (or alternatively, $v = 1/o$).

Once autonomous investment is introduced, however, v becomes exclusively a behaviour coefficient. (The only exception to this statement arises in the highly improbable case of $\theta > 0$, $a = 1$, autonomous investment present that is entirely non-competing; in this case v continues to equal $1/o$.)

In these circumstances G_w as the growth rate that equates planned saving and investment is no longer sufficient as an equilibrium growth rate. Or rather, it is only if v fortuitously adopts the values indicated in Cases 3 and 4 (which together amount to $\theta > 0$ and $\alpha < 1$). For the equality between planned saving and investment (or planned and realised investment) is sufficient as an equilibrium growth condition only if the planned investment is properly allied with the technical capital coefficient that determines the increase in productive capacity forthcoming. Otherwise, even, if planned saving equals planned investment (or planned investment is realised), output capacity may grow at a rate in excess of or below the growth in income and spending.

However, regardless of the effect of the introduction of autonomous investment on G_w, as long as not all autonomous investment is competitive, the full-capacity growth rate, r, is lower in its presence than in its absence.

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PRICE VELOCITY AND DYNAMICS

THE value of a commodity, as our first lesson in Economics tells us, depends on the interaction of supply and demand. For any commodity, whether it be beer or butter or diamonds, there is a supply curve and a demand curve, and at their point of intersection is to be found the "equilibrium" price of the commodity, *i.e.*, the level to which the actual price of the commodity, whatever it happens to be, tends to move.

Our elementary lesson, however, takes us a little farther than this. It also tells us, implicitly, if not explicitly, that supply and demand can be used in two senses:

(*a*) in the case of perishable goods, in the sense of *flow* supply and *flow* demand, and

(*b*) in the case of goods which are in "fixed supply," in the sense of *stock* supply and *stock* demand.

(*a*) The price of milk, for example, is determined by the flow-supply and the flow-demand curves for newly produced milk, *i.e.*, by the curves showing how much new milk would be produced per unit time by the dairy industry and how much would be bought in the same time unit by consumers and manufacturers at various prices. The market for milk is what might be called a "flow market," *i.e.*, a market in which *newly produced* units of a particular commodity are sold by producers (or middlemen) and bought by consumers. The essence of a flow market is:

(1) that only newly produced units are dealt in;

(2) that demand for this flow of new units is a function of the price per unit; and

(3) that transactions are invariably in the direction producer-to-middleman-to-consumer, never in the direction consumer-to-middleman or consumer-to-consumer.

(*b*) The example usually given of a *stock* demand and supply is in respect of the equilibrium price of the works of a deceased artist. Here it is assumed that there is a demand curve that gives the number of pictures the community would wish to own at various prices—the pictures are assumed to be homogeneous—whilst the supply curve is a vertical straight line indicating that, whatever the price may be, the supply of paintings by this particular artist is the number actually in existence. (This is usually referred to as the case of "fixed supply," although it is not often made clear that the supply in question is the actual *stock* of the commodity, *not* the flow per unit time of newly produced units.) The market for paintings by a deceased artist is what might be called a "stock" market, which we define as a

market in which demand is a stock function of price, and in which transactions take place in any direction, *i.e.*, not only in the sense dealer-to-consumer, but also consumer-to-dealer and consumer-to-consumer.

The assumptions lying behind this conventional " supply and demand " analysis are two-fold:

(*a*) That in the case of " flow " goods (such as milk or beer or cigarettes) an individual's flow demand for any particular good depends (i) on his income, (ii) on his " tastes " as between different flow goods, and (iii) on the relative prices of such goods; so that, *given his income and tastes,* his actual flow demand for a particular good will be a function of the price of that good, assuming also that the prices of all other goods remain fixed. In other words, with " other " data remaining constant there will exist, in respect of each flow good, a flow demand curve showing how many new units the individual would demand per unit time at each possible price level.

(*b*) In the case of " fixed supply " goods (pictures by deceased artists, first-editions of books, antiques) an individual's stock demand for any particular asset will depend (i) on his capital wealth, (ii) on his " tastes " as between different types of assets, and (iii) on the relative prices of these assets; so that, *given his wealth and tastes,* his stock demand for any particular asset will be a function of the price of that asset, assuming again that the prices of all other goods remain fixed.

In both cases, our individual's equilibrium as regards his annual expenditure on the various flow goods, and as regards his distribution of his wealth between different capital goods, is governed by the so-called equi-marginal principle. In regard to flow goods, he arranges his expenditure such that the " last " pound per year spent on each flow good yields the same utility; whilst in respect of capital assets the " last " pound of wealth " stored " in any particular type of asset must yield the same satisfaction as the last pound " stored " in any other type of asset.

To take an example: given an individual's wealth and tastes, the number of Georgian teaspoons that he would want to own would be a function of the price per spoon; and we could draw up a curve showing how many spoons he would demand at various prices. If we then add up these demand curves for all collectors in the economy we get the combined demand curve for the economy as a whole, showing how many Georgian teaspoons would be demanded at various prices; and this curve, in conjunction with the " curve " showing the actual number of such spoons in existence, would determine the equilibrium price per spoon.

To recapitulate: economic theory has told us, in effect, that the price of a " fixed supply " good is determined by the actual stock in existence in conjunction with the " capital assets preferences " of the economy. But at this point the obvious question poses itself: why is the analysis confined to

so-called "fixed supply" goods (Georgian teaspoons, paintings by Rembrandt) and not to other capital assets? The justification for drawing up a stock, as opposed to a flow, demand curve for Georgian teaspoons or Rembrandts is that they fall into the capital sphere of an individual's calculations; but if that is the case, why do we not apply the same analysis to other capital goods even if they are not in "fixed supply," *i.e.*, even if they *are* currently produced? Our theory fails to explain why we can apply the stock analysis to pictures by Cézanne but not to those by Picasso; to Georgian teaspoons but not to modern ones. Surely the decision to buy a Picasso falls into an individual's "capital asset" sphere in the same way as if it were a Cézanne?

The illogicality of orthodox economic approach is at once apparent if we consider an hypothetical example. A well-known artist, say, with a distinctive style of his own, has produced a number of works. Suppose, that he is taken ill and has to give up painting. The number of works that he has produced up till this time, then, is the total stock of his paintings in existence; and, according to orthodox economic analysis, this quantity, in conjunction with the public's stock demand for his works, must determine the equilibrium price per painting.

But suppose now that our artist stages a sudden recovery, leaves his bed of sickness and resumes his artistic career. Are we to say that, because he is once again turning out so many paintings a month, the equilibrium price per painting is determined by the supply curve of *new* works per month coupled with the public's demand curve for *new* works per month?

In the same way, suppose it had been thought that the world's sources of diamonds have become exhausted. There is then a fixed stock of diamonds in existence which, together with the public's stock demand for diamonds, will presumably determine the equilibrium price per diamond. Suppose, now, that a new diamond field is discovered and that this field goes into production and begins contributing to the world's stock of diamonds. Are we then to switch immediately from a stock to a flow analysis of price determination? Is it not possible to evolve an analysis in which the same basic theory applies—in which the return to health of the artist, or the discovery of a new diamond mine, can be fitted into the general framework without the need for a radically different approach?

The difficulty in applying stock analysis to the case of capital goods whose supply is *not* fixed is a real one; for if price *is* determined by stock demand and supply, and not by the supply and demand curves in respect of new diamonds, what factor does in fact bring the flow of *new* diamonds into harmony with the demand for new diamonds? We are faced, in fact, with a problem of conflicting dimensions: demand is a stock function of price, whilst production (supply in the *flow* sense) is a flow function of price. And clearly one cannot expect to equate a stock with a flow function!

What is the way out of the difficulty? The suggestion made in this paper is that, if a good belongs to the capital sphere, then the stock approach is the

appropriate one; and that the temporary "balancing-factor" between the supply of new diamonds, on the one hand, and the demand for new diamonds, on the other, is the *rate of change of price*, or "price velocity," as it is generally called.

In algebraic terms, let D be the stock demand for diamonds at any time t, and S the actual stock in existence at this time.

Then

$$D = f(p)$$

i.e., stock demand is a static function of price of p and will not alter unless price alters.

If we assume that no diamonds "wear out," then the rate of increase of stock supply, $\frac{dS}{dt}$ must be equal to the production function $g(p)$, *i.e.*,

$$\frac{dS}{dt} = g(p)$$

We can now draw up two distinct supply and demand relationships, the second being derived from the first:

(1) a stock relationship, *i.e.*, that at any given *moment* the stock demand tends to equal stock supply; and

(2) a flow relationship, *i.e.*, that in any short *period* of time Δt the increment in supply tends to equal the increment in demand. (If x is always equal to y, then Δx must equal Δy.)

1. The stock relationship is expressed quite simply by the equation

$$D = S$$

i.e.,

$$f(p) = S$$

(As S is determined at any given moment, this equation must determine the level of price at this moment.)

2. The flow relationship is to the effect that

$$\Delta D = \Delta S$$

where ΔD and ΔS are the increments to stock demand and supply during the period Δt.

Let price change by Δp during this interval.

Then

$$\Delta D = \frac{dD}{dp}\Delta p$$

where $\frac{dD}{dp}$ is the derivative of the demand function with respect to price.

The flow relationship therefore becomes

$$\frac{dD}{dp}\Delta P = \Delta S$$

Dividing through by the time interval Δt, we get

$$\frac{dD}{dp} \cdot \frac{\Delta p}{\Delta t} = \frac{\Delta S}{\Delta t}$$

and in the limit as $\Delta t \longrightarrow 0$ this becomes

$$\frac{dD}{dp} \cdot \frac{dp}{dt} = \frac{dS}{dt} = g(p)$$

i.e., the supply function.

$$\therefore \quad \frac{dp}{dt} = \frac{g(p)}{dD/dp}$$

By definition, the stock elasticity of demand is

$$E = \frac{dD/D}{dp/p}$$

$$\therefore \frac{dD}{dp} = \frac{ED}{P}$$

Substituting above, we get

$$\frac{dp}{dt} = \frac{p}{ED} \cdot g(p)$$

Two equations have thus emerged:

(1) an equation $D = S$, which determines the actual price at any moment; and

(2) a differential equation which determines the rate of change of price at any moment, *i.e.*, the differential equation

$$\frac{dp}{dt} = \frac{p}{ED} \cdot g(p)$$

What, then, has happened to our concept of " equilibrium price "—that price to which the prevailing price tends to move and where it would then come to rest? Is such an " ultimate " price compatible with a differential equation defining the rate of change of price?

The answer is Yes—provided the differential equation is such that dp/dt approaches zero for a particular value of p—say p_0. This value p_0 would then be the equilibrium price. The question, then, as to whether an equilibrium price exists for diamonds (to revert to our example) boils down to the problem, is the function $g(p)$ of such a form that:

(a) for a particular value p_0 of the independent variable p the derivative dp/dt is zero; and

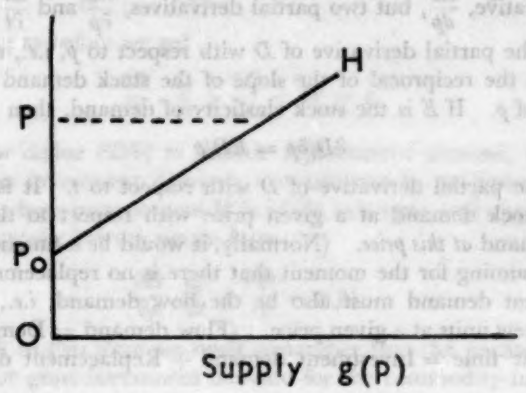
(b) for values of p greater than p_0 the derivative dp/dt is negative. (If $p > p_0$, then if dp/dt is negative, price will *fall* till at p_0 dp/dt will be zero and hence price will remain steady.)

Let us consider briefly a typical supply function. In the diagram let P_0H be the flow supply curve in respect of diamonds.

Normally there will be a minimum price OP_0 below which no production

will occur. If price should initially happen to be at some level OP greater than OP_0, then the derivative dp/dt, *i.e.*, $\frac{p}{ED} \cdot g(p)$, must be negative as elasticity E is negative. Hence, as dp/dt is negative, price is falling; and it is only when it reaches the level OP_0 that dp/dt will become zero, since at this price $g(p)$ is zero. OP_0, then, is the "classical" equilibrium price in the sense that if price is at any higher level it will tend to move down to OP_0; but once it has reached OP_0 there is no tendency for it to change.

What appears to emerge from this analysis, then, is that, not only is there a prevailing price at any given moment and an "ultimate" equilibrium price p_0, but also a definite price velocity if the forces of supply and



demand are to be in continual balance; and the differential equation determining this price velocity will also express the *path* of price as it moves through time towards its ultimate level. The analysis may, therefore, throw light on some of the problems falling into the branch of Economics known as Dynamics.

In this particular example relating to diamonds we have reached the conclusion that the price of diamonds would fall from any higher level to that price p_0 at which the production of new diamonds would cease. At this stage there would be no production of new diamonds (although there might conceivably be some exchange of existing diamonds within the economy). But this "stagnation" equilibrium would come about only in the special circumstances we have assumed, viz., that demand is a constant (static) stock function of price, and that diamonds are physically indestructible and not subject to what is generally called "obsolescence." The second condition may well be true of diamonds, but it is unlikely to apply to many commodities; and the first condition is unlikely to apply to any commodity at all except under the very special circumstances of what is known as a "stationary state."

Let us now try to modify our assumptions so as to bring our economic model more closely into correspondence with reality. Let us now assume that stock demand, instead of being static, *i.e.*, purely a function of price, is dynamic, *i.e.*, a function not only of price but also of time as well.

Thus, in place of $D = f(p)$, we now write:

$$D = f(p,t)$$

For the time being we retain the assumption that all units of the commodity are "permanent," so that no units "wear out" and have to be replaced. (Later, we shall discard this simplifying assumption as well.)

As demand is now a function of two variables, p and t, there is no longer a single derivative, $\frac{dD}{dp}$, but two partial derivatives, $\frac{\partial D}{\partial p}$ and $\frac{\partial D}{\partial t}$.

$\partial D/\partial p$ is the partial derivative of D with respect to p, *i.e.*, at any given moment it is the reciprocal of the slope of the stock demand curve for a given value of p. If E is the stock elasticity of demand, then

$$\partial D/\partial p = ED/p$$

$\partial d/\partial t$ is the partial derivative of D with respect to t. It is the rate of increase of stock demand at a given price with respect to time, *i.e.*, the *investment* demand *at this price*. (Normally, it would be a function of price.) As we are assuming for the moment that there is no replacement demand, this investment demand must also be the flow demand, *i.e.*, the rate of demand for new units at a given price. (Flow demand = Demand for new units per unit time = Investment demand + Replacement demand at a given price.)

If ΔD is the increment in stock demand during any short time interval Δt, and ΔS is the increment to stock supply, then

$$\Delta D = \frac{\partial D}{\partial p}\Delta p + \frac{\partial D}{\partial t}\Delta t$$

The "flow" equation for the commodity is:

$$\Delta D = \Delta S, \text{ since } D \text{ is always equal to } S.$$

$$\therefore \frac{\partial D}{\partial p}\Delta p + \frac{\partial D}{\partial t}\Delta t = \Delta S \quad . \quad . \quad . \quad . \quad . \quad . \quad (1)$$

Or,

$$\frac{\partial D}{\partial p}\cdot\frac{\Delta p}{\Delta t} + \frac{\partial D}{\partial t} = \frac{\Delta S}{\Delta t}$$

In the limit as $\Delta t \longrightarrow 0$ this becomes

$$\frac{dD}{dt} = \frac{dS}{dt}$$

i.e.,

$$\frac{\partial D}{\partial p}\cdot\frac{dp}{dt} + \frac{\partial D}{\partial t} = \frac{dS}{dt} = g(p)$$

where $g(p)$ is the supply (flow) function.

The " balancing " price-velocity at any given moment is therefore

$$\frac{dp}{dt} = \frac{g - \frac{\partial D}{\partial t}}{\partial D/\partial p} = \frac{p}{ED}\left(g - \frac{\partial D}{\partial t}\right)$$

Suppose now we drop the assumption that all units of the commodity are indestructible. Let us assume instead that the commodity wears out at a rate of W units per unit time.

In time interval Δt, $W\Delta t$ units are " worn out." Equation (1), therefore, becomes

$$\frac{\partial D}{\partial p}\Delta p + \frac{\partial D}{\partial t}\Delta t = g(p) \,.\, \Delta t - W\Delta t \quad (\text{since } \Delta S = g \,.\, \Delta t - W \,.\, \Delta t)$$

and proceeding as before we get

$$\frac{\partial D}{\partial p} \cdot \frac{dp}{dt} + \frac{\partial D}{\partial t} + W = g$$

Let us now define $\partial D/\partial t$ to include replacement demand, *i.e.*, it now stands for gross investment demand, and not merely net investment. In other words, we have incorporated W in $\partial D/\partial t$, as it were, and our differential equation once again has the simple form

$$\frac{\partial D}{\partial p} \cdot \frac{dp}{dt} + \frac{\partial D}{\partial t} = g(p)$$

If we use it in this form we must remember that the partial derivative $\partial D/\partial t$ stands for gross investment demand for the commodity in question.

How does this approach affect so-called " equilibrium " analysis?

As far as ultimate " static " equilibrium goes, the answer is, not at all. The ultimate equilibrium price p_0 must be such that it satisfies the equation $\partial D/\partial t = g(p)$, *i.e.*, the price velocity $\frac{dp}{dt}$ must be *zero*.

But, as far as the dynamic process of adjustment goes, the answer is, a great deal. At any moment t, given the current market price p, price is tending to move to the equilibrium level at a rate $\frac{dp}{dt}$ given by the flow equation. Eventually, if our functions remain unchanged for long enough, price will eventually get to the equilibrium level (say p_0) and the price velocity will be zero. But, in the intervening period, price velocity is an essential " balancing factor " between supply and demand.

Let us examine the equilibrium process in a little more detail. Remembering that the derivative $\frac{\partial D}{\partial p}$ is always negative, we can re-write the flow equation as

$$\frac{\partial D}{\partial t} - \frac{\partial D}{\partial p}\frac{dp}{dt} = g(p)$$

1. Suppose, first that $g(p) > \frac{\partial D}{\partial t}$.

Then, to satisfy the flow equation, $\frac{dp}{dt}$ must be negative, *i.e.*, price must be falling. But, if price is falling, then $g(p)$ is decreasing and $\frac{\partial d}{\partial t}$ is increasing. Eventually they are brought to equality and $\frac{dp}{dt}$ becomes zero, *i.e.*, price has reached its equilibrium level p_0.

2. If $g(p) < \frac{\partial D}{\partial t}$, $\frac{dp}{dt}$ must be positive and price must be rising. But this makes $g(p)$ larger and $\frac{\partial D}{\partial t}$ smaller. Eventually they must become equal and $\frac{dp}{dt}$ will be zero. Price will then have reached the level p_0 at which $\frac{\partial D}{\partial t} = g(p)$.

In the case of a commodity, such as houses, where there is a true stock market in the sense discussed above, two equations must be satisfied by p_0 for it to be the equilibrium price, viz., the stock equation $f(p) = S$ and the flow equation $\frac{\partial D}{\partial t} = g(p)$.

At any given moment there is what might be called a " relative equilibrium " price to which price, *at that moment*, is tending. Thus if the actual stock of the houses at time t_1 is S_1 then the relative equilibrium price at that moment is given by the value p_1 satisfying the stock equation $f(p) = S_1$. But, unless at this level p_1 the flow demand happens to be equal to flow supply, the price velocity will not be zero and p_1 cannot be the " ultimate " equilibrium price. The ultimate equilibrium price must be that value p_0 which satisfies the flow equation $\frac{\partial D}{\partial t} = g(p)$ as well as the stock equation $f(p) = S$. At this level of price there is no tendency for either production or the level of stock S_0 to alter (except at the appropriate rate). There will, in effect, be " absolute " equilibrium in the industry in question.

A close analogy to the whole process is the case of an accelerating body. If a uniform force F is applied to a body that is being accelerated in air, or any sort of medium offering resistance, the " equation of balance " at any moment is of the form

$$F - M\frac{dv}{dt} = g(v)$$

where M is the mass, v the velocity, $\frac{dv}{dt}$ the acceleration and $g(v)$ the resistance function. Given the velocity v at any moment, the body's acceleration at that moment is determined by the equation. However, the ultimate *equilibrium* velocity is given by the solution v_0 to the equation $F = g(v)$, for

the reason that $g(v)$ is an *increasing* function of v, and as F and M are both positive, $\frac{dv}{dt}$ must get smaller and smaller as v increases. Eventually it is the final velocity v_e that balances the applied force F, on the one hand, and the air resistance $g(v)$, on the other. But in the intervening period (which in strict theory is infinite) the rate of change of velocity, *i.e.*, acceleration, plays as big a part as the velocity itself in the equation of balance.

To get back to economics: although the above analysis has been evolved in a discussion of equilibrium in the case of a commodity where demand is a stock function of price, it would seem that this dynamic process applies equally to "flow" demand *provided the commodity is such that the level of stock kept is some function of the ruling price.* Coal is perhaps an example. Demand is clearly a flow function of price; but it is likely that the level of stocks kept by consumers and middlemen would be dependent on the prevailing price.

Let $g(p)$ be the flow supply function, *i.e.*, the rate of supply of new units of the commodity, and $N(p)$ the consumption and investment demand at a given price, and $D = f(p)$ the stock demand function, *i.e.*, the level of stocks that the economy would wish to hold at any given price.

Suppose price changes by Δp in time Δt. Then the demand for new units in this interval Δt tends to equal the supply of new units during this interval.

Supply during the interval $= g(p)\Delta t$

Demand during the interval = Consumption and investment demand, plus increase in stock demand

$$= N(p)\Delta t + \Delta D$$

Now
$$\Delta D = \frac{dD}{dt}\Delta t = \frac{dD}{dp} \cdot \frac{dp}{dt}\Delta t$$

$$\therefore\ N\Delta t + \frac{dD}{dp} \cdot \frac{dp}{dt}\Delta t = g\Delta t$$

In the limit as $\Delta t \longrightarrow 0$, this becomes

$$N + \frac{dD}{dp} \cdot \frac{dp}{dt} = g$$

and as $\frac{dD}{dp}$ is negative it is really of the form

$$N - \frac{dD}{dp}\frac{dp}{dt} = g$$

Mathematically, this is identical with the equation derived above, viz.,

$$\frac{\partial D}{\partial t} - \frac{\partial D}{\partial p} \cdot \frac{dp}{dt} = g$$

It is clear that, provided the level of stocks is a function of price, the price velocity dp/dt plays the same role in the process of dynamic adjustment

for a commodity subject to flow demand as it plays in the case of stock demand.

In fact, an interesting conclusion has emerged—that, although in the text we have gone to some pains to distinguish between "flow" goods, on the one hand, and "capital" goods, on the other, *mathematically there is no distinction between the two classes of goods*, and the same type of equation can express the state of demand in either case.

In general, we can say that the demand for any commodity can be expressed by a dynamic stock function of the form—

$$D = f(p, t)$$

so that the flow demand, *i.e.*, the demand for new units of the commodity per unit time, is of the form

$$\frac{dD}{dt} = \frac{\partial D}{\partial t} - \frac{\partial D}{\partial p} \cdot \frac{dp}{dt}$$

In the case of a "capital" good $\partial D/\partial t$ stands for net investment plus replacement demand, whilst in respect of a "flow" good it stands for net investment plus consumption demand, in both cases at a given price. In either case $\partial D/\partial p$ is the reciprocal of the slope of the stock-demand curve.

If, by the nature of things, stock must always be zero, or is not affected in any way by price changes, then $\partial D/\partial p$ is zero, and flow demand is simply $\partial D/\partial t$, *i.e.*, the consumption demand. (This would be true of services, or where a commodity is highly perishable, such as milk.)

Of course if the commodity happens to be incapable of depreciation, as in the case of diamonds, then in a stationary economy investment demand might be zero, so that flow demand in these circumstances would be simply $\frac{\partial D}{\partial p} \cdot \frac{dp}{dt}$, which is the case we discussed at the beginning of the article on p. 68.

Indeed, the distinction between a "flow" and a "capital" good becomes simply one of degree. A "capital" good is one where the ratio of D to $\partial D/\partial t$ is relatively high; a "flow" good is one where this ratio is relatively low. (In the case of ships, or machinery, or houses, the ratio of stock at any moment to annual demand for new units is relatively high; in the case of milk, or meat, or coal, the ratio is considerably lower.)

A final point remains to be considered: the question of consumer equilibrium in respect of capital goods and flow goods.

As far as I have been able to discover from the literature, no distinction is made in utility theory (or for that matter in indifference-curve analysis) as between capital and flow goods.

In fact, however, an analogous problem of dimensions exists as in the

case of price analysis. Our consumer somehow has to achieve equilibrium between, say, his *stock* of suits, on the one hand, and his flow-consumption of cigarettes, food and other commodities, on the other.

The usual treatment of the problem is roughly as follows:

Suppose our consumer is wondering whether to buy another suit or not. The suit is assumed to have a life of, say, 5 years. If the suit costs £15, then his problem is supposed to be this: would £3 a year spent on other goods bring him in as much extra satisfaction in the year as the new suit? If not, then it is clearly to his benefit to buy it.

A moment's reflection, however, will show that the extra satisfaction brought in per year by the new suit will depend largely on his existing stock of suits. If he had no other suits at all the extra satisfaction per year would be great; if he had already owned 100 suits it might well be negative.

Clearly, the problem cannot be solved without bringing in the *stock* of suits owned by the consumer. But how is this *stock* to be brought into equilibrium with the *flow* of consumption goods?

The problem might, it is suggested, be solved along the following lines:

Just as a man is presumed to enjoy certain increments to his flow of satisfaction through additional cigarettes per month, so he could be presumed to enjoy increments to his flow of satisfaction through adding to his stock of suits. We now have a common measure to apply to the extra consumption of cigarettes and to the increment to the stock of suits—the additional flows of satisfaction per unit time. Thus our consumer might feel that the extra flow of satisfaction from the 14th suit in his wardrobe would about equal that derived from the 20th cigarette *smoked per day*.

Given the prices of cigarettes, suits and the rate of interest at which the consumer can borrow money, our problem is soluble. Our consumer must adjust his expenditure such that the last pound per month spent on cigarettes gives him the same satisfaction as the last pound per month "spent" on suits. The last pound per month spent on cigarettes presents no problems. But the last pound per month spent on suits is calculated as follows: given any particular stock of suits, say 14, the items of "cost" involved are:

1. The monthly interest on the extra capital locked up in having 14 instead of 13 suits.

2. The extra monthly sum that must be set aside to keep the stock of 14 suits constant. (Depending on the average life of the suits, a new suit must be bought every so often to keep the wardrobe intact.) Suppose, then, that increasing his stock of suits from 13 to 14 will involve an additional cost of £1 per month (this £1 being the sum of the interest payable on the *extra* capital tied up in the form of suits plus the *extra* amount that must be set aside to keep the stock intact). If, then, the last pound spent on cigarettes per month brings in the same extra satisfaction, our consumer must have reached equilibrium at the

prevailing price levels, as between his flow consumption of cigarettes, on the one hand, and his stock use of suits, on the other.

In certain cases only item (1) is relevant, viz., when the commodity in question is such that its effective life is unlimited, *e.g.*, precious jewels, "Old Masters" and other works of art which do not necessarily depreciate as they get older. In these cases, item (2) falls away, and the only monthly "cost" that a diamond brooch, say, involves is the monthly interest on its current market value (plus an insurance premium if the owner decides to insure it). If this amount of interest should bring the consumer a greater flow of satisfaction through being spent on consumption goods than the flow derived from the diamond brooch, then it would pay the owner to sell the brooch and to enjoy a higher income with the proceeds. But if the two flows are equal, then our consumer is in equilibrium as between his enjoyment of the brooch and of consumption goods.

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SOME ECONOMIC FEATURES OF THE LONDON CAB TRADE[1]

THE London cab trade is an unusual industry in several respects. There is free entry of both capital and labour, but cab fares are officially regulated. The drivers other than those who drive their own cabs are remunerated on a commission basis, for which there are few parallels elsewhere. Finally, there are very few large firms in the trade. In this paper I shall examine the reasons for this system of remuneration and the history of large firms, and then discuss some policy questions.

THE ORGANISATION OF THE TRADE

As a preliminary, some background description is needed. Let us start with the regulations concerning drivers and vehicles, which are the responsibility of the Metropolitan Police.[2] They issue cab drivers' licences to all applicants who pass a medical test, a special driving test and a knowledge of London test. This third requirement is the most difficult to meet. It takes a driver up to twelve months' hard work to acquire the intimate knowledge of London which is necessary.

In a sense these requirements impede entry to the trade, but nonetheless the situation is one of free entry, because anyone who passes the tests gets his licence: there is no restriction of numbers. The situation is the same with respect to the cabs. The number is not limited, but all cabs have to be of an "approved type," conforming to certain "Conditions of Fitness." These are designed to secure that the cabs are highly manœuvrable, safe and commodious, and include the requirement of a twenty-five-foot turning circle. Each cab is inspected once a year prior to relicensing, and it is the practice for cabs to be given a major overhaul before being presented for inspection. There are also quarterly inspections and spot checks, where the discovery of any serious defect will lead to the requirement that the cab be taken off the road until the defect is remedied.

London cab fares are prescribed by Statutory Order, and the taximeters have to be approved and sealed by the Police. The present fare scale is a hiring charge of 1*s.* (2*s.* in the small hours) plus 3*d.* for each fifth of a mile

[1] This paper was completed before I entered the Economic Section of the Treasury.

I am extremely indebted to a number of people connected with the cab trade for providing me with information. They include Mr. Clode (Public Carriage Office), Mr. Pummel (Editor of *The Steering Wheel*), Messrs. Perkins and Watson (Beardmore Motors), Mr. Robert Overton (Mann and Overton Ltd.), Mr. Robbins (London Transport Executive), Mr. Senior (Esso Petroleum), Mr. Houghton (London General Cab Co.), Mr. Melinsky (Dives Ltd.) and Mr. Sydney Leigh.

[2] The following description of regulation is based on paragraphs 6–14 of the *Report of the Committee on the Taxicab Service* (Cmd. 8804, 1953), known as the Runciman Report, which is the best single source of information on the trade. An interesting account of the trade in the early thirties is provided by G. J. Ponsonby in *The New Survey of London Life and Labour*, Vol. VIII.

when speed exceeds 4½ m.p.h. or for each 2½ minutes at lower speeds, subject to a minimum charge of 1*s.* 9*d.* This is the time and distance fare. In addition, there are "extras" for extra passengers and for luggage. If a journey exceeds six miles or one hour the prescribed fares do not apply, and the driver is free to bargain. Such journeys often take a cab into areas where the driver is unlikely to find any jobs, so that they involve him in a certain amount of waste mileage returning to central London.

So much for the regulation of the trade. Those engaged in it fall into three groups: proprietors, owner-drivers and journeymen. Journeymen are those who drive proprietors' cabs. They are not employees, but hire cabs as bailees from proprietors, who bear all the running costs. At present their earnings consist of approximately 39% of the time and distance fare, plus all extras (including the additional shilling for night hirings), plus tips. An interesting additional minor item is the commission paid by some hotels and night-clubs to drivers who bring them clients (one night-club pays the princely sum of 10*s.*).

The distinction between proprietors and owner-drivers is not a clear one. Some owner-drivers ("mushes") work their cab on a day shift and let a journeyman take it out for the night shift, *i.e.*, they "double" their cab. Others may own more than one cab, and some even own up to ten cabs while still driving themselves. The majority of owner-drivers started as journeymen, accumulating savings until they had enough to make the down payment on a cab. On the other hand, many journeymen are ex-owner-drivers. Those who made a success of it, however, may gradually acquire more cabs and become proprietors. There are few trades where an individual can start off on his own with so little capital.

The Commission System

Before the advent of the taximeter the cab owners had no means of knowing how much money any particular driver earned on a particular day. On the other hand, they could form a pretty fair idea of average takings, since those of them who were owner-drivers would have their own records of takings. Consequently, the predominant arrangement between proprietors and journeymen before the taximeter was introduced was the hiring system. Under this system the journeyman paid so much a day for the use of the cab and horse and kept the whole of the day's takings less this fixed amount. Since there were considerable seasonal variations in takings, however, the cab hire also varied seasonally—at any rate following an arbitration award made by the Home Secretary in 1894 after a drivers' strike. The award fixed a scale according to which the daily hire varied between 10*s.* and 16*s.* The peak of the season was the Eton and Harrow cricket match.

The taxameter (as it used to be called) made possible other methods of remuneration. It was widely used in Germany in horse-cab days, but its introduction in London was resisted by the horse-cab drivers, and it only

came into use on a large scale in 1907. In this year motor cabs first appeared in large numbers, and they were all fitted with meters registering fares according to a scale for motor cabs fixed by the Home Secretary.

Since the meter gave the proprietor an accurate indication of the total mileage and of the time and distance receipts of each cab each day, various other methods of driver remuneration now became possible. These were: (*a*) the mileage system, where the journeyman hired the cab for so much per mile; (*b*) the fixed wage, where the driver was paid a regular wage and handed over to the proprietor all the receipts registered on the meter; and (*c*) the commission system, under which the driver retained a certain percentage of the receipts registered on the meter. This system has become the overwhelmingly dominant one, but in the early years there was a great diversity of practice. Thus in 1911 the following systems were in use:

> The drivers of the largest company, the General Motor Cab Company, and of other large companies received 25% of time and distance receipts and were charged for the petrol consumed. (The company claimed 75% of extras as well as of the time and distance fare, but the men regarded the whole of the extras as their perquisite and usually avoided recording them on the meter.)
>
> Another company paid 20% of the first £9 receipts and 25% thereafter, not charging the drivers for petrol.
>
> A small proprietor hired his cabs at 4½*d.* a mile, petrol included.
>
> Another paid the drivers 3*s.* per day plus 10% on the first £1 and 15% thereafter, petrol provided.[1]

Since the commission system predominated even before 1914, it is worth inquiring what the disadvantages of the other systems are. The major relevant factor is undoubtedly the need of proprietors to provide their journeymen with an incentive to work hard. Apparently the takings of a cab depend to a very considerable extent upon the effort exerted by the driver. A lazy driver who proceeds to the nearest cab rank immediately after each job and sits there until it is his turn to be hired will take much smaller receipts than the driver who energetically searches for fares. The pure wage system would obviously make the driver indifferent to the amount of his takings (so long as he took enough to avoid being sacked), which explains why it was never used. All the other systems provide the driver with some incentive.

The system which gives the greatest incentive to drivers to maximise receipts is obviously the hiring (flat rate) system, for there the driver keeps the whole of the receipts in excess of the daily hiring charge. The hiring system did in fact persist upon a substantial scale for quite a long time. In

[1] This information and many of the points in the following discussion of the relative merits of different systems are derived from the Minutes of Evidence of the *Departmental Committee on Taxi-cab Fares*, 1911, (Cd. 5875), which provide a wealth of material on the trade.

the early thirties, for example, the largest proprietor, London General Cab Co. Ltd., allowed its drivers to choose between the hiring system and the commission basis, and it was estimated that in all roughly 10% of drivers in 1930 were working on flat rate. None the less, it has not been popular; many proprietors argued against it in 1911, as did some union representatives, and the Cab Section of the T.G.W.U. always opposed it, seeking to abolish it in collective bargaining. Since the commission system gives a smaller marginal incentive to drivers to work hard, it is clear that the need for a method of remuneration which provides incentive is not the only factor at work.

The two other factors which seem relevant are risk and running costs. Under the commission system, fluctuations in earnings from day to day are shared by the proprietor and the journeyman, while on the flat-rate system the whole of these fluctuations would be borne by the journeyman. While some of the more experienced drivers may be confident of their ability to take in more than the hiring fee each day and to bear a widely fluctuating income, many others are clearly averse to this risk.[1] In general, we may suppose that proprietors, who have some capital behind them, are in a better position to bear it. This point was made in 1911 by a proprietor who had had many years of experience with horse cabs. The driver and proprietor working on the commission basis, he said:

> " are partners in the business; they take equal risks, they share or should share in the success or misfortune of the day's work. No matter how unfortunate the driver may be in securing fares, he is sure of his share of what the cab earns—he cannot draw a blank. But if we revert to the old system, there would be a resurrection of all the old troubles in the trade, which we had hoped were dead and buried with a taximeter for tombstone. Weather conditions would again dominate the business. Fog, sun, rain, a dry Lent and the dull season would find the cabs piled up in the garages. Cab riders would be driven to buses, trams and tubes—and why? You have a fixed (hiring charge), the driver looks out on the weather (and) knows that (even) with the best of good luck he will be out of pocket if he goes to work. He wisely determines to sit by the fire and we do not blame him. What has happened? The proprietor has his cabs in the garage, the requirements of the public are not met, the driver is idle and earns nothing." [2]

In addition to the risk factor, running costs were another factor which made many proprietors unwilling to contemplate introducing the hiring system. In the early days tyre wear was extremely important, in 1911

[1] The driver, said one of their representatives in 1911, displays " human nature, and very weak at that, and if he had a sovereign to-day unfortunately he does not do as the employer does, who has a banking account and takes it as he wants it, but he gets home and his wife says ' Tommy wants a pair of boots '—and he has nothing to assist him in bad times. The whole existence is from hand to mouth . . . . When a man goes out and takes only 2/-. or 3/-. (home) there is the pawning business, the man asking his wife to take her wedding ring off." (Cd. 5875 Q. 1799.)

[2] Cd. 5875 Q. 2299.

amounting to over a penny per mile. Thus even when the drivers paid for petrol under the hiring system there was a considerable divergence of interest between proprietors and drivers, since the latter tended to run up more miles per day than the proprietors liked. Setting a maximum mileage with extra payment for excess miles (as was done by London General Cab Co. Ltd. in the early thirties) partly met this, but variations within the maximum still caused difficulty. An additional difficulty arose with doubled cabs, since there were continual arguments between day and night drivers concerning the amount of petrol contributed by each.

The commission system shared risk and made the proprietors' receipts vary with engaged mileage, which bears some relationship to total mileage, and hence running costs. On the other hand, it provided a substantial incentive to drivers to work hard. The mileage system would have linked proprietors' receipts even more closely with running costs, but provided neither as much incentive as the flat-rate hiring system nor the guarantee of fully utilising the cabs in bad weather which the commission system secured. Thus it fell between two stools, and the commission system became the predominant one side by side with a small amount of flat-rate hiring, which appears to have faded out of existence later on.

Since the labour market is fairly well informed, market imperfections cannot explain the fact that at any one time the terms offered by proprietors are not uniform. In the early twenties the drivers of pre-war cabs used often to receive a higher commission than the drivers of newer vehicles which were more attractive to the public and were consequently able to earn more. To-day, however, this factor is not operative, and some other explanation must be sought. One point is that the good driver brings in a larger day's takings than his fellows, so that it is worth while for proprietors to compete for him by offering better terms. The other point is that the percentage commission is not the only feature of the relationship between proprietor and journeyman. The other features, as listed in an advertisement for drivers in a trade journal, include " Cabs available at any time, large fleet of F.X.4. D's (the most modern cab), First class service, Heaters, Sick Club Scheme, Run-you-home service for off-route drivers," and holidays-with-pay-schemes are common since 1956. All these features attract drivers and therefore, to a limited extent, are substitutes for a higher commission. The quality of service is important, since if a cab has to be taken off the road owing to a defect the driver loses earning time.[1]

The Size of Firms

The first motor cabs appeared in London in 1904, at which time there were a little over 11,000 horse cabs. By 1913 there were nearly 8,300 motor

[1] Apart from these differences in terms, some proprietors offer special terms for night shifts and for Sundays. The special terms for night drivers (40% is not unusual) presumably reflect a higher supply price for night drivers than for day drivers, while the special Sunday rates (*e.g.*, 10*s.* flat for the whole day) are granted because Sunday is a slack day.

cabs, and the number of horse cabs had fallen to less then 2,000. This was innovation with a vengeance, and it is interesting to see who the innovators were and how they fared.

In horse-cab days cabbing was an industry of small firms. In 1893, for instance, fewer than 15% of the cabs were owned by proprietors with fleets of more than fifty cabs, and the largest proprietor owned only 281 cabs.[1] Hardly any of these seized the opportunities offered by the advent of the motor car. The innovators were mainly new companies formed by people without experience in the horse-cab trade. Furthermore, they came in on a grand scale: in 1911 no less than 75% of the cabs licensed were owned by only twelve companies, and of them four accounted for over four thousand!

The largest company was the General Motor Cab Company, incorporated in May 1906. It was sister company to a French company which had already started operations in Paris, and half the directors were French. Its initial capital was about a quarter of a million pounds, and it proposed to start operations with five hundred new Renault cabs. On the basis of the experience of the French company, it was anticipated that takings per cab per day would average £1 15*s*. It was proposed to pay the drivers 25% of this and to charge them for the petrol, leaving £1 6*s*. 3*d*. per day, which appeared sufficient to provide very handsome profits as the prospectus showed.[2]

At first, the claim that this estimate was made on a conservative basis seemed justified. In the first six months of operation takings per cab per day averaged £2 3*s*. 6*d*., 8*s*. 6*d*. more than forecast in the prospectus. More capital was raised and large-scale expansion planned, the Chairman stating in September 1908 (when a final dividend brought the total dividend declared for the year ending in July up to 13%) that there was " nothing to interfere

[1] See Appendix I to the Minutes of Evidence of the *Committee of Enquiry into the Cab Trade of the Metropolis*, 1895 (C. 7607). All the other statistics of the total number of cabs are taken from the Annual Reports of the Commissioner of Police of the Metropolis.

[2] The following figures appear in it:

	Per day per cab	Per annum 500 cabs (300 working days)
	s. *d.*	£
1. Management, general expenses and insurance	2 0	15,000
2. Cleaning	10	6,250
3. Tyres	4 6	33,750
4. Upkeep of motors	2 0	15,000
5. Upkeep of car bodies	1 6	11,250
6. Oils	5	3,125
Total working expenses	11 3	
Giving a balance of	15 0	112,500
Less: Meter rent of £7 p.a.		3,500
Licence at £2 p.a.		1,000
Depreciation of £50 p.a. (£300 over 6 years)		25,000
		29,500
Yielding a net profit of		£83,000

with the continued expansion of the company's enterprise, and he feared competition least of all." By June 1909 the company was running 1,500 cabs, and this number had increased to over 2,300 by December 1910.

Alas for the shareholders, this expansion of the volume of business was not matched by the record of dividends. Net profits for the financial years ending in July moved as follows:

1907–8	£118,307
1908–9	£152,789
1909–10	£60,716
1910–11	–£67,520

In 1912 the Company's creditors moved in, and there was a financial reorganisation. In 1913 it was amalgamated with the British Motor Cab Company and wound up. Yet a monument to this mammoth pioneer still remains; its Brixton garage, which cost it £176,354, is still the largest garage in the trade, though in post-war years the number of cabs operating from it has rarely exceeded four hundred. The economist gazing upon it can reflect that even when an investment proves to be a big mistake for the shareholders it is not totally wasted for the economy as a whole.

The General Motor Cab Company was not alone in its troubles. By the middle of 1910, if not earlier, a majority of the large proprietors were asking for an increase in fares, and this led to the setting up of the Departmental Committee on Taxi-cab Fares in April 1911.

What were the reasons for the sorry state of the large companies? Not unnaturally, the companies themselves were prone to explain it as being due to factors largely outside their control, but the Committee were not disposed to accept all their arguments. Without following the intricacies of the arguments put forward, let us consider only those points which the Committee considered valid.[1]

First, they agreed that taxes had been higher than originally anticipated owing to an increase in the weight of taxis, which had brought a higher scale of duty into operation. Secondly, they agreed that a shortage of drivers prevented some of the companies from running all their cabs (the General Motor Cab Company had 1,000 cabs unlicensed owing to a shortage of drivers), but felt that " if the supply of drivers should go on increasing at the rate at which it has been increasing in the last few months there seems to be no doubt that there will be no shortage of drivers to prevent the cabs being properly worked." Thirdly, they agreed that average takings per cab had fallen considerably. In the year ending March 31, 1911, for instance, the General Motor Cab Company had averaged only £1 5*s.* 3*d.* per day as against £1 17*s.* 6*d.* in the year ending June 1909 and £2 3*s.* 6*d.* in the six months ending in November 1907. They pointed out the obvious

[1] The Report of the Committee, an admirable one, was published as Cd. 5782 in 1911.

reason for this—" the sudden intrusion on the streets of an increased number of cabs." Supply had expanded vastly, and demand had not.

The companies also stated that costs had been higher than they anticipated. Listen to the *cri de cœur* of the Managing Director of a company with 495 cabs: " We know the working costs at present are far greater than was thought when this business was gone into. Nothing on earth would have tempted me to have gone into the cab business if I had known what I know now." [1]

Genuine though these complaints were, they met with little sympathy. The Committee examined detailed cost figures of twelve companies representing 5,423 cabs and concluded that " there is no reason why, with proper and careful management, the present fares should not enable a reasonable profit to be earned by the present cab owners," though they proposed some reduction in the motor-car tax. They argued that in any case " it would be a mistake to increase the fares, as the competition of tubes, electric trams and motor omnibuses presents formidable rivalry to the taxi-cab."

There is no doubt that the Committee was right, for the simple reason that the number of motor cabs continued to rise, albeit more slowly. They were also right in forecasting some improvements in the supply of drivers, since the ratio of motor-cab drivers licensed to motor cabs licensed rose from 1·02 in 1910 to 1·11 in 1913.

None the less, the large companies which were the main innovators gradually vanished from the scene. Why did this happen when the trade as a whole expanded up to the First World War and regained its pre-war size in the mid-twenties?

One possible reason is that the innovators had to bear certain once-and-for-all costs of innovation. They had to acquire know-how in cab management, and they had to train drivers at a cost, according to one proprietor, of about £5 per driver. But their competitors who followed them, so the argument would run, could then take over both this know-how and many of the trained drivers. This undoubtedly happened. In 1911 the General Motor Cab Company claimed to have trained 80% of London's motor-cab drivers (many of whom were ex-horse-cab drivers), and the Chairman said that a fair number of them had left to work for other proprietors. Yet even if for this reason the innovators' initial expenses exceeded those of their followers, it does not seem enough to account for their failure. I suggest that the primary reason why the large companies did not survive was simply that they were large; that scale economies were insubstantial.

The large companies, of course, maintained that economies of scale were important. The Chairman of the General Motor Cab Company, for instance, stated that—

> " it goes without saying that a large well-organized concern can work more economically than a small one. When you take into considera-

[1] Cd. 5875 Q. 3065.

tion a business like that of the General Motor Cab Company with its huge consumption of every requirement attached to the motor cab industry, it must necessarily enable that company to buy goods considerably cheaper than the small proprietor can do. Take the question of tyres. I am quite satisfied that we can buy our tyres probably fifteen per cent . . . cheaper." [1]

The drivers did not think much of these arguments. Their main contention, however, related less to size as such but rather to the form of organisation; they thought that the companies spent an excessive amount on administration. As one driver put it, "They will not stand the way they are managed now. I mean to say the palatial offices, turnstiles to let the men in and turnstiles to let them out, and about ten sorts of index cards of how many miles a cab does." [2] Another driver referred to the experience of companies in horse-cab days:

> "There has never been a company for the last thirty years in the horse trade that has ever been able to stand. We have had many and all had to go down, and while they have gone down the man who started from the bottom of the ladder with one horse has run his numbers up to fifty and one hundred. The same thing is occurring to-day. We have men who started with one motor, but have run up to fifty and going on to one hundred, and will be some of the biggest proprietors eventually in the trade."

This driver did not think well of highly paid directors:

> "We had a very important engagement to see the managing director of a company, and we had to wait a fortnight before we could see him as he was in Monte Carlo. What would they have said to the old horse proprietor if you wanted to see him and he was in Monte Carlo! You usually found him at the horse repository. . . . People cannot afford to pay a man to be in Monte Carlo when he ought to be seeing if the cylinders are all right."

This "on the one hand but on the other hand" sort of discussion is necessarily inconclusive. In order to get somewhere we shall therefore carry it no further and instead follow Professor Stigler's argument [3] that "the competition of different sizes of firms sifts out the more efficient enterprises. . . . An efficient size of firm, on this argument, is one that meets any and all problems the entrepreneur actually faces: strained labour relations, rapid innovation, government regulation, unstable foreign markets and what not."

[1] Cd. 5875 Q. 1992. A second argument is that, in the case of large fleets, fluctuations in the number of cabs off the road because of accidents and for small repairs are relatively smaller than in the case of small fleets; the same holds for drivers absent through sickness and part-time drivers turning up for work. This should mean that the large fleets could obtain a better average degree of utilisation of their cabs than the small fleets. (This consideration, however, was irrelevant in 1911, since, as we have seen, the large companies had cabs idle for want of drivers.).

[2] Cd. 5875 Q. 1747. The next quotations are from Q. 2567 and Q. 2572.

[3] George J. Stigler, "The Economies of Scale," *Journal of Law and Economics*, Vol. I, 1958.

We do not have the data which would enable us to apply Professer Stigler's technique in detail. It requires us to "classify the firms in an industry by size, and calculate the share of industry output coming from each class over time. If the share of a given class falls, it is relatively inefficient, and in general is more inefficient the more rapidly the share falls." Now the only detailed figures available of the distribution of cabs between owners (given in the Runciman Report) are for 1938 and for 1947 to 1952. These figures tell us little about optimum size, since for the first few years after 1947 fleet sizes probably reflected the durability of pre-war cabs rather than anything else. However, it is at least clear that large fleets have provided a diminishing share of the total number of cabs. Thus, firstly, the percentage of cabs in fleets of over one hundred cabs fell from 17 in 1938 to 13·5 in 1952 and 8·1 in 1958. Secondly, the largest fleet numbered only about 550 in the early thirties and is under 300 to-day. We can therefore deduce that the main reason why the large companies did badly in the early days of motor cabs was that they were too large to operate at the high standard of efficiency necessary for survival.

It is possible that the size of some of the larger fleets to-day reflects the past history of the trade. If the proprietors in question had to pay for their present large premises at reproduction cost they might soon be bankrupt. Yet the premises may be worth more as a taxi garage than in any alternative use. If this is correct, we can therefore say that some of the fleets are as large as they are only because the amount originally invested in their garages was an irretrievable mistake.

Some Questions of Policy

In conclusion, we shall review three issues relating to the regulation of the trade by the authorities. The first of these relates to the Conditions of Fitness which are responsible for the special features of the London cab. An extreme alternative to the present requirements would be to allow the use as cabs of any ordinary saloon car in sound mechanical condition. This has not been proposed in London, though there have been suggestions that the twenty-five-foot turning circle (which is the main factor differentiating cabs from other cars) should be increased.

Any relaxation of the Conditions of Fitness which allowed cabs to be more like ordinary saloon cars would reduce the cost of new cabs, and thus lower the cost of running cabs, particularly if smaller vehicles with a lower fuel consumption could be used. This is the argument in favour of altering the Conditions of Fitness.

The argument against relaxation, in so far as it relates to the turning circle in particular, is that the present requirement makes cabs very manœuvrable, so that they can do U turns and leave cab ranks without adding much to traffic congestion. If the turning circle were greater, so it is maintained, cabs would obstruct traffic more when turning, and would in

general add to traffic congestion by being less able than at present to pick up fares smoothly and to use crowded narrow streets.[1]

If the Conditions of Fitness were relaxed, permitting cheaper vehicles to be used as cabs, the presumption is that with a single uniform fare scale the more expensive cabs would gradually disappear, being replaced entirely by the cheaper ones. This naturally raises the question of whether cheaper and smaller cabs should not be allowed to operate at a lower fare scale. The public would then be able to choose between a cheap ride in a small cab and a more expensive ride in a large one.

This possibility was considered by the "Two-seater Cab Committee" set up in 1925. Most members of the trade argued strenuously against the introduction of the two-seater cab running at a lower fare. They admitted, however, "that their main objection was against the introduction of a differential fare which would force all fares down; and that their other objections were mostly only incidental to this."[2] The objection of existing owners is natural enough; they would clearly suffer. Yet to argue that all fares would be forced down does somewhat exaggerate the long-term effect. There are some cities abroad (*e.g.*, Helsinki) where two classes of cab run, each with its own fare scale. It is not certain, therefore, that two classes of cab could not co-exist in London. It is possible that difficulties might arise where a prospective hirer required a cab of a different type from that at the head of a rank, but in 1925 the Police witnesses "anticipated that this difficulty could be overcome; and it must be borne in mind that the hirer has already the right to select any cab from the rank."[3]

This brings us to the second policy issue, namely the regulation of fares. There is, to start with, the question of whether fares should be regulated at all. This question is one which would shock the trade, yet it deserves an answer, since it is certainly not impossible for fares to be unregulated. There was, for instance, a period when fares were below the legal maximum in New York, while fare cutting by owner-drivers has occasionally been reported (in hushed tones) in London. If we make the judgment (and it is no more than that) that the public would prefer a fixed and known tariff to a slightly lower but unknown tariff subject to bargaining, the question on which the issue hinges is whether each cab can carry some clear indication of the fare scale it is charging which the hirer can see before he hails a cab. If not, the case for an officially fixed scale seems strong, provided that the scale is fixed at or near the optimum level.

Let us now consider the effects of fare changes. So far as the elasticity of demand is concerned, I have nothing to add to what Professor R. G. D. Allen has said in his admirable paper written for the Runciman Committee (of which he was a member) and printed as Appendix V to its report. On

[1] These arguments are set out in the *Report of the Taxicabs (Conditions of Licensing, etc.) Committee*, 1928.

[2] Cmd. 2466 p. 13.

[3] Cmd. 2466 p. 12.

the basis of the operating statistics of five large proprietors for periods in 1951 and 1952 sandwiching a fare increase, he decided that: "The most that can be concluded is that the elasticity of demand for cabs as a whole is around or rather below unity . . . (and) . . . even this needs to be supported by more evidence than is presently available."

Fares went up in September 1957.[1] Presumably the belief of the proprietors and drivers who argued in favour of this increase was that the elasticity of demand was less than unity. Had they supposed it to be greater than unity, they would hardly have advocated it; certainly the drivers would not have done so, while owners would have done so only if they anticipated a large reduction in total mileage, and hence in mileage costs. On the whole, however, it seems likely that a fall in the number of engaged miles is accompanied by an opposite movement of disengaged mileage, so that there is no cost saving.

Granted, for the sake of argument, that the elasticity of demand is less than unity, what will be the effects of an upward revision of the fare scale? (We assume cost and demand conditions to remain unaltered.) The short-run result will be a reduction in the number of engaged miles and a rise in takings per cab. This will make the trade appear more attractive, inducing an inflow of new drivers and new cabs into the trade. If drivers are scarce, the purchase of new cabs in excess of replacement may wait upon the increase in the number of drivers, which will inevitably take some time. Sooner or later, however, more cabs will be running. The greater availability of cabs which this involves may result in some increase in the total mileage. The main effect, however, upon our assumption of unchanged demand, will be that takings and engaged mileage per cab will fall off. Hence the initial improvement in proprietors' and journeymen's earnings will not endure. The only permanent result of the fare increase will therefore be an increase in the number of cabs and drivers and a fall in the percentage of engaged mileage. The fare increase will therefore raise the earnings of those already in the trade only temporarily. Conversely, a reduction in fares would drive some people from the trade but would not permanently lower the earnings of those remaining in it. This is the inevitable corollary of freedom of entry and of exit.

In the last few years cab fares have been standing at a little over twice the pre-war level. (So have L.T.E. fares.) On the other hand, though fuel cost per mile has risen in the same proportion, the cost of a cab has tripled, and so has the general wage level. Consequently, the cost of running a cab and the opportunity earnings of drivers have risen by a great deal more than takings per engaged mile. For cab owners to be breaking even, a rise

[1] The number of cabs on the streets was rising during 1957 and 1958. Had demand remained unchanged, we should therefore expect the number of engaged miles per cab to be lower in 1958 than in 1957. The indication is, however, that it rose, so the rise in takings affords no evidence concerning the elasticity of demand.

in the percentage of engaged mileage must have taken place, and so it has. In the late thirties the percentage was about 40, while in the last two or three years it has been round about 57.

Since the average annual total of miles per cab is not substantially different now from its level during 1936–38, and since the total number of cabs is now a little less than 6,000 as against 7,683 at the end of 1938 (7,923 at the end of 1937), it follows that the total engaged mileage of all cabs is not much greater now than it was then. By definition,

Total engaged miles = Total miles per cab × Percentage of engaged miles × No. of cabs

Assuming an average annual mileage per cab of 30,000, this gives a pre-war total of roughly 96 million miles and a 1958–59 figure of the order of 103 million miles. If we assume instead that average cab mileage has risen to 35,000, this figure becomes 133 million miles. Even so, the smallness of the increase is surprising in view of the rise in real *per capita* incomes, the growth of population and the fall in cab fares relative to the prices of most other services. Presumably the reasons are two fold. First, there is the growth of private-car ownership. Secondly, the increased congestion of London streets has reduced the convenience of cabs relative to other forms of transport. Thus during the early days of the Pink Zone experiment in 1959 when private-car parking in central London was restricted (so that private cars were used less and congestion was reduced) engaged miles increased.

This discussion brings out clearly the choice which has to be made by the authorities in deciding the level at which the fare scale is to be fixed. Given costs and demand, a higher level of fares will raise the number of cabs and lower the percentage of engaged mileage. Thus the choice lies between low fares and low availability, on the one hand, and high fares and high availability, on the other. A compromise must be reached between cheapness and convenience as in some other forms of transport.

The third policy issue is that of " limitation," *i.e.*, setting a ceiling on the number of cabs and/or drivers. Such limitation would, if effective, raise earnings in the trade. Limitation was abandoned in London as long ago as 1833, but there has been intermittent agitation for it for many years. There is limitation in several provincial cities and in various cities abroad.

Where a limitation of licences is effective and licences are transferable one would expect licences to acquire a market value equal to the capitalised value of the excess of earnings over opportunity costs. Thus in New York one or two years ago a " medallion," as it is known there, was worth about twenty thousand dollars. When the authorities proposed a tax of five cents per hiring the cab trade threatened to strike. This threat was abandoned when the authorities said that they would retaliate by issuing more medallions, and the tax was then introduced. The market value of a medallion

then fell by a couple of thousand dollars. This confirms our expectation about the effects of limitation on the value of licences almost as well as any controlled experiment could do.

This explains why the trade favours limitation, except for aspirant owner-drivers, who fear that it would make it more difficult for them to acquire a cab. As compared with a state of free entry, fewer cabs would run, and the percentage of engaged miles would be higher. From the point of view of the public this means a loss in convenience owing to the lower availability of cabs. It is therefore difficult to see why the public should welcome limitation.

The Trade has recently reasserted its belief in the need for control of entry.[1] They suggest a ceiling on the numbers of cabs and drivers which might be varied from time to time and some control of movement between journeyman driving and owner driving. Both proprietors and the Union argue that a stable labour force is essential. On the proprietors' side the argument is that an efficiently high degree of fleet utilisation is hampered by the loss of journeymen who become owner-drivers. On the Union side it is maintained that unregulated entry to the trade makes it difficult to provide security for its members, and that sooner or later there would be a reversion to bad pre-war conditions. All parties agree that the amount of work to be done is limited, so that once the cab trade has reached its proper size, further entry of additional cabs and drivers would merely spread out the amount of work to be done.

Concluding Remarks

At the end of 1959 the number of cabs was 5,980 and there were only five fleets of more than 100 cabs. It is thus a trade where small firms predominate. As we have seen, this was not the case in the early days of the motor cab. In other respects, however, the main features of the trade have changed very little over the years. I have shown what some of these features are, and how they affect the working of the trade, and have briefly surveyed some of the problems of public policy which are of long standing, and will no doubt continue to be raised in years to come.

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[1] In a memorandum *The Case for Stabilization of the London Cab Trade* prepared jointly by the four organisations of the Trade, The London Motor Cab Proprietors' Association, The Motor Cab Owner Drivers' Association, The Taxi Fleet Operators' Federation and The Transport and General Workers' Union.

CAPITAL IMPORTS AND GROWTH—THE CASE OF NEW ZEALAND—FOREIGN INVESTMENT IN NEW ZEALAND, 1840–1958

JOHN KNAPP, in an article in the September 1957 issue of this JOURNAL, has argued that the importance of capital exports in giving rise to growth in the past has tended to be much exaggerated. The following investigation illustrates Knapp's important thesis in the case of New Zealand capital imports.

A consistent surplus of imports is an indication of capital inflow into an under-developed country. By imports we shall understand visible imports and net payments for services such as freight, consular expenses by Government, insurance, travelling expenses and so on, but not payments of interest and dividends. By including "invisible imports" net (that is payments minus receipts) exports can be defined as visible exports only.

PART I. SOME FACTS ABOUT NET CAPITAL IMPORTS INTO NEW ZEALAND

1840–86. The period 1840–86 is one when capital imports were an important aspect of New Zealand's development. Import surpluses were a regular feature of New Zealand trade returns as can be seen from Table I:

TABLE I

Imports and Exports of New Zealand 1840–87

(£ million)

	Imports.	Exports.	Balance (Import Surplus).
1840–49	1·5	0·5	1·0
1853–59	6·7	2·6	4·1
1860–69	49·5	31·4	18·1
1870–79	67·5	53·8	13·7
1880–86	52·1	44·9	7·2
	177·3	133·2	44·1

Source: *Official Year-Book*, 1902. Figures for 1850–52 not available.

From 1887 onwards New Zealand showed with rare exceptions export surpluses year by year.

It can be seen that New Zealand's import surpluses during the forty-seven years of her status as an "immature debtor country" amounted to £44 million.

By 1887 central and local Government debt amounted to £44 million. If we assume that £38 million of this debt was raised abroad [1] it can be seen

[1] See Appendix I.

that the New Zealand Government borrowed about £38 million to cover the import surplus of our country's formative period. Interest payments on this debt may have amounted to about £21 million for the whole period.[1] The net inflow of sterling available for the finance of imports was, therefore, in the vicinity of £17 million on Government account.

The private sector had also to pay interest and dividends on capital invested in New Zealand. These payments were probably small, because investors were frequently immigrants who ploughed back their profits and because the habit of leaving profits in the business was generally well developed during that period of economic history.[2] Thus we have assumed that total remittances on private interest and dividend account were only a quarter of Government payments, *i.e.*, £4 million. New Zealand also accumulated some foreign reserves during that period (estimated at £2 million), this leaves us to assume that private capital inflow during the first forty-seven years of this country's history was something in the vicinity of £33 million, as can be seen from Table II:

TABLE II

Public and Private Capital Inflow into New Zealand 1840–86

(£ million)

Amounts required for foreign payments:	
Import surplus	44
Government interest payments	21
Private interest	4
Foreign reserves	2
	71
Amounts found:	
Through Government borrowing	38
Private investment	33
	71

It is this initial £71 million gross debt incurred for the finance of New Zealand's import surplus of £44 million during her formative period which by virtue of the workings of compound interest grew by 1935 to a Government foreign debt of £185 million and a private foreign sector in the New Zealand economy of unknown size, but probably not far from £40 million. For New Zealand had no import surpluses of note from 1887 until the fifties of the present century.

1887–1906. This period has been chosen because Simkin has made some investigation into capital imports into New Zealand during the years under consideration.[3] Simkin writes:

"Net external borrowings fall into three distinct periods. From 1862 to 1880 large sums were being raised abroad, almost entirely in

[1] See Appendix, I.

[2] Compare for example John Knapp, "Capital Exports and Growth," ECONOMIC JOURNAL, September 1957, p. 439.

[3] C. G. F. Simkin, *The Instability of a Dependent Economy* (Oxford 1951), pp. 43–4 and 84–5.

London. During the next twenty-seven years [*i.e.*, from 1880 to 1906, the period under consideration—W. R.] new loans were seldom sufficient to pay interest and amortisation on old loans" (pp. 43–4).

And with regard to private capital Simkin states:

"Thereafter [after 1884—W. R.] negative values of capital import appear without exception, owing to the deepening depression and later, to the provision of mortgage capital by the State Advances Office and other new lending agencies. It is notable that the largest export of private capital coincided with the banking crisis. Over the whole period [1860 to 1910—W. R.] our estimates show the private capital imports were not far from zero; they were a stimulus to development in the earlier period [1860–85—W. R.], but a drag on prosperity in later years" (pp. 84–5).

My own estimates which are given below in Table III show no net private capital imports during the period in question and an increase in Government debt (which always includes Local Authority borrowing) by £21 million. Government borrowing was not enough to pay for £43 million interest due, and if we estimate private interest payments at £750,000 per year the additional £15 million payable show why the export surplus of £41 million accumulated during the twenty years under review had to be supplemented by borrowing.

TABLE III

Foreign Investment in New Zealand 1887–1906 *

(£ million)

Foreign exchange required:		
For Government interest payments		43
Private interest payments, etc.		15
Increased foreign reserves		3
		61
Money found by:		
Government borrowing	21	
Export surplus	41	
		62
Excess borrowing used to finance capital outflow		1
		61

* For sources and explanations see Appendix II.

The period 1887–1906 sets the pattern for the years until 1935. Foreign investment in New Zealand during that period did not make available new capital funds, but merely represented interest payments not remitted and accumulating in the shape of an ever-increasing debt burden—or what amounts to the same, payment of interest and subsequent borrowing of the amount so paid.

1907–14. This is a period of very active Government borrowing. Simkin writes of this period: "Borrowings did little to help the boom until *after* 1907" (p. 44). Government borrowing was £32 million during this

comparatively short period, and for once exceeded interest payments on debt. These amounted to £25 million, leaving £7 million for other purposes. £2 million of this borrowing served to increase reserves. Indeed, there are good grounds to believe that the accumulation of reserves was considerably greater. For included in our borrowing is the sum of £5 million raised at the end of the year 1913/14 for redemption of debentures falling due early in 1914–15.[1] If our assumption is correct, it can be seen that even during the buoyant borrowing period of 1907–14 public foreign borrowing made no net contribution to capital formation in New Zealand. As to private foreign investment, the export surplus of £14 million was probably enough to pay £1 million interest, profits and dividends year by year and to leave a small amount available for investment abroad.

Table IV shows that the amount of private investment leaving the country between 1907 and 1914 cannot have been large, and was probably in the vicinity of £8 million.

TABLE IV

Foreign Investment in New Zealand 1907–14

(£ million)

Foreign exchange required:		
For Government interest payments		24
Private interest payments		8
Increased foreign reserves		2
		34
Money found by:		
Government borrowing	33	
Export surplus	14	
		47
Excess borrowing used to finance:		
Capital outflow	8	
Government funds for redemption of securities	5	
		13

It is not easy to give a fully satisfactory explanation for the sustained capital outflow from New Zealand which our figures reveal. One reason may be that apart from mortgage lending, opportunities for the investment of surplus funds in New Zealand were small. Capitalists who had accumulated funds in New Zealand looked for their investment in British securities in the absence of a capital market in New Zealand. And with the ease of international remittance which was a matter of course in the pre-First World War period a considerable outflow of capital can be explained in such terms. Another explanation which may be offered relates to the nature of exporting business done. In many instances exporters were local agents of foreign-domiciled firms. Exports, although declared at their full value at the time of export, led not necessarily to an equivalent remittance of funds to New Zealand. Anything not required for payment of working expenses in New Zealand might have been kept by way of working capital

[1] See *Official Year-Book*, 1915, p. 719.

in the head office of the exporting firm. Finally, there is likely to have been an outflow of capital gains made by the rise in land values through the process of legacies benefiting the relations of deceased farmers and station owners who had still very close relations with the old country, and occasionally by the return to the old country of people who had made their fortune in New Zealand.

1915–19. The startling thing about the finance of the First World War is that no net foreign funds were required for New Zealand's First World War effort. The payment of interest on public debt actually exceeded public borrowing during that period by £6 million, or by 40%. On the other hand, there was again a considerable outflow of private capital. Nevertheless, the substantial export surpluses accruing to New Zealand during the First World War plus Government borrowing were sufficient not only to pay for the capital outflow which occurred but also to enable the banking system to accumulate substantial reserves. Table V shows the foreign-exchange position as it presented itself during the years 1915–19:

TABLE V

Foreign Investment in New Zealand 1915–19

(£ million)

Foreign exchange accruing to New Zealand:	
From export surpluses	35
From Government borrowing	15
	50
Used for:	
Paying interest on public debt	21
Paying interest on private debt	5
Accumulating exchange reserves	13
Capital outflow	11
	50

It can be seen from Table V as from all prior tables (except Table I) that what foreign money was borrowed by New Zealand did not in the main serve productive purposes. It served during the period under review, as it did in all other cases after 1886, to pay interest on debt and to finance an outflow of capital. No wonder that interest became a heavier and heavier burden on the national economy.

1920–34. The post-war period brought into the open the weight of foreign payments to which New Zealand had committed herself during the eighty years of her existence. Although foreign borrowing reached record proportions (£78 million was borrowed during that period), interest payments absorbed £123 million. By 1934 interest payments on the public debt alone (including Local Authority debt) amounted to £7·1 million. Exports in that year were recorded at £47·3 million, so that interest payments on public debt absorbed 15% of New Zealand's export receipts. In the worst year of the slump, 1932, interest payments amounted to over 22% of export receipts.

The unproductiveness of foreign borrowing was increased during that period because of the growing international liquidity preference of the New Zealand banking system. Whereas in former years comparatively small reserves seemed sufficient for the maintenance of international liquidity—in 1920, for instance, exchange reserves were about £22 million with imports of £61 million [1]—by 1934 £27 million exchange reserves backed imports of £31 million. Some of the foreign borrowing was used to create these increased exchange reserves, as can be seen from Table VI:

TABLE VI

Foreign Investment in New Zealand 1920–34

(£ million)

Foreign exchange accruing to New Zealand:	
From export surpluses	67
From public borrowing	78
	145
Used for:	
Payment of interest on public account	107
Payment of interest on private account	16
Capital outflow	5
Build-up of foreign reserves	17
	145

1935–39. With 1935 a new period starts in the history of foreign investment in New Zealand. By that time it had become painfully clear that borrowing to pay interest—which was all New Zealand had been doing since 1886—could not go on without serious repercussions. The Labour Government which came to power in 1935 embarked, therefore, on a policy of debt repayment. For the first time in New Zealand's history the foreign-domiciled public debt was reduced, the amount during the period in question being £10 million.

1935–39 was a period of flight of capital from New Zealand in addition to conscious debt repayment. This can be seen if we realise that during the period an export surplus of £33 million was available to meet debt repayment of £10 million, interest on private foreign investment in New Zealand, amounting to an estimated £4 million, leaving £19 million for payment of interest on public debt amounting to £32 million for the five-year period in question. Thus a fall in foreign reserves of £13 million might have been expected. In the event, exchange reserves dropped by £27 million sterling, showing an outflow of £14 million private capital during the period.[2]

[1] Admittedly 1920 was an exceptional year, but imports exceeded £42 million until 1930.

[2] All figures quoted for this period are in sterling—due to the fact that the balance-of-payments figures (*Official Year-Book*, 1941, p. 197) are kept in sterling. For further notes on figures see Appendix II.

The *Official Year-Book*, 1941 (p. 198), gives the following explanation of the capital movement:

> "Part of the balance is probably due to the investment of New Zealand funds in Australian securities during 1936–37; but there is reason to believe that the bulk of the 1936–37 fall in London funds is accounted for by the repatriation, during that year, of overseas funds temporarily domiciled in New Zealand, a considerable volume of credits accruing on overseas account since the raising of the exchange rate having been retained in New Zealand in the expectation of a fall in the rate. The balance in 1937–38 is mainly due, it is believed, to the investment of New Zealand private funds in Australian and other British securities and to the repatriation of capital, for which reasons also, but mainly the former, there was a much more substantial outflow in 1938–39."

Thus while no new debt was incurred from 1935 to 1939, New Zealand did not draw on foreign-exchange reserves to finance her programme of full employment. Exchange reserves were not used to finance import surpluses, there were export surpluses; exchange reserves were run down to finance an unplanned outflow of capital. In order to stop this outflow severe import and exchange controls were imposed in 1938. The situation is described in Table VII.

TABLE VII

Foreign Investment in New Zealand 1935–39

(£ sterling)

	£ million.	£ million.
Funds available:		
Export surplus		33
Required for:		
Payment of interest on public and private debt	36	
Repayment of public debt	10	
Private capital outflow	14	
		60
Loss of foreign reserves		27

1940–48. This period covers the Second World War and the remaining years of the Labour Administration. The policy of debt reduction which was inaugurated in 1935 was continued, and the Second World War ended with New Zealand's foreign central Government debt reduced by £36 million and Local Authorities foreign debt reduced by £6 million. The policy of debt reduction continued in the early post-war period, and by 1949 a further £17 million were repaid. (Values expressed in sterling.)

During this period the New Zealand Government made a free gift of £NZ13·5 million to the United Kingdom. This accounts probably for the fact that there seems to be another outflow of capital. Overall it seems as though during the entire period private capital inflow was more or less balanced by private capital outflows, so that it does not appear that foreign investment made any substantial contribution to New Zealand's growth

during the early post-war period. In fact, the period of the Second World War and of the last years of the Labour Administration were a period of New Zealand lending and repaying on foreign account rather than the other way round. This is brought out by Table VIII.

TABLE VIII

Foreign Investment in New Zealand 1940 to 1948/49

(£NZ)

	£ million.	£ million.
Funds available:		
From export surpluses		255
Required for payment of interest on:		
Public account	52	
Private account	30	
	—	82
		173
Available for foreign lending or repayment of debt as follows:		
Repayment of debt	74	
Gift to United Kingdom	13	
Build-up of short-term funds in London	86	
	—	173

1949–58. This period, which covers the March years 1948/49 to 1957/58, is particularly well documented. Apart from the year 1949/50, full details are available in the *Official Estimates of the New Zealand Balance of Payments*, published annually by the Government Statistician.

Another advantage of this period is that in 1950, for the first time in New Zealand history, an inventory of private foreign investment in New Zealand was made which showed private investments by overseas residents in New Zealand amounting to £46 million. This amount did not include the capital of banks and insurance companies, but it does nevertheless offer a starting-point for an appraisal of the role of foreign capital in the New Zealand economy.

Table IX shows the total of foreign investment in New Zealand as at April 1, 1949, as far as officially ascertained:

TABLE IX

Foreign Investment in New Zealand as at April 1, 1949

(£ million)

Public debt:		
Central Government	106·8	
Local Authorities	6·2	
	—	113·0
Less First World War debt cancelled		26·1
		86·9
Private direct investment in New Zealand (*i.e.*, excluding portfolio investment) from:		
United Kingdom	28·4	
Australia	13·2	
North America	3·9	
Others	0·3	
	—	45·8
		132·7

Source: *Official Year-Book*, 1951/52

The amount of £132·7 million compares to a national income of £419 million during 1948/49 and to exports amounting to £148 million in 1948. The improvement in New Zealand's foreign position can be seen from the fact that in 1934 the Governmental foreign debts alone amounted to £158 million,[1] representing almost three and a half times the country's export proceeds.

Interest payments on debt in 1949 amounted to about £3·0 million on the public debt and £3·4 million on private account—a total payment of £6·3 million, or only just over 4% of all export proceeds. On the other hand, New Zealand received over £1 million of interest and dividends on her own investments overseas.[2] This compares to an interest burden of £8 million in 1934[3] being about 17% of that year's and almost 20% of the previous year's exports.

Net foreign investment in New Zealand since 1949 has increased as follows:

TABLE X

Increase in Net Foreign Investment 1949/50 to 1957/58

(£ million)

Year.	Direct investment.	Other private net capital inflows.		Government and official net borrowing.	Total.
		Foreign funds.	Sale of assets.		
1949–50	2·6	−4·4		− 2·5	−4·3
1950–51	6·7	− 1·5	3·8	−13·5	−4·5
1951–52	12·4	− 1·0	1·8	− 4·5	8·7
1952–53	9·6	− 1·0	4·9	− 0·4	13·1
1953–54	1·2	− 1·8	—	7·6	7·0
1954–55	12·8	− 1·7	1·0	6·5	18·6
1955–56	17·2	− 0·8	—	2·5	18·9
1956–57	10·9	− 1·6	—	11·3	20·6
1957–58	13·4	− 1·5	0·3	1·8	14·0
	86·8	−15·3	11·8	8·8	92·1

Sources: for 1949–50, *Official Year-Book*, 1950, p. 599; for 1950–52, *Official Estimates of Balance of Payments*, 1954; for 1953–58, *Official Estimates of Balance of Payments*, 1958.

It can be seen that during the first two years of our period the movement of foreign-debt repayment which was characteristic of the Labour period 1935–49 continued. From then onwards, New Zealand started on some new net borrowing.

A very interesting aspect of the most recent period of New Zealand's

[1] This amount is £184 million gross central Government and Local Authorities foreign debt minus £26 million First World War debt suspended.

[2] See *Official Year-Book*, 1950, p. 599.

[3] *Official Year-Book*, 1938, p. 223.

history is that, for the first time since 1886, New Zealand has started to import real capital again. There have been substantial import surpluses over the years. These, going hand in hand with a period of very high internal investment activity, are an indication of the need for supplementation of internal by foreign savings.

At the same time there has been an ever-increasing flow of payments abroad on account of foreign investment. The result has been that capital that did come into the country served only to a small extent to add to New Zealand's real resources, most of it was used to pay interest and dividends, and the process of building up debt by compounding interest and adding it to capital seems well on the way again. Table XI shows the growth of net overseas payments of interest and dividends on public and private account during the period under review. (" Net " means, of course, the payment of interest abroad after deducting receipt of interest, etc., from abroad. This latter amount has been quite considerable during the period, but we shall not be concerned with it in detail.)

Another item has been added to Table XI. That is the payment of net commissions and royalties. These payments are in many instances equivalent to the payment of dividends and interest. Frequently overseas investors

TABLE XI

Payment of Interest, Dividends, Profits, Royalties and Commissions (All Net) By New Zealand, 1949–58

(£ million)

Year.	Net interest and dividends, etc.		Royalties and commissions.	Total.
	Public.	Private.		
1949–50	2·9	2·1	0·8	5·8
1950–51	2·2	5·3	0·8	8·3
1951–52	1·4	5·2	1·7	8·3
1952–53	0·7	6·7	1·6	9·0
1953–54	−0·6	6·9	3·1	9·4
1954–55	0·5	8·7	3·2	12·4
1955–56	0·4	7·9	3·6	11·9
1956–57	−0·2	10·2	5·9	15·9
1957–58	0·5	11·6	4·8	16·9
	7·8	64·6	25·5	97·9

Sources as Table X.

(and their capital contribution may be significant) instead of requiring a remittance of profit on shares in a New Zealand enterprise, make available patents, trade marks, goodwill and knowledge in exchange for payment of stated royalties on the sale of the goods manufactured under licence. In many instances the difference between the payment of royalties under such

agreements is an alternative to the payment of dividends and interest; and in all cases it is a cost of foreign investment in New Zealand.

It can be seen that Government debt payments have been extremely small. Owing to the considerable sterling-security holdings of the New Zealand Government and official institutions such as the New Zealand Wool Commission, there have even been two instances when Government has made a small net contribution to New Zealand's current balance of payments on foreign investment account. On the other hand, the outflow of private income payments has increased steadily year by year. Since not far from half of the earnings of direct foreign investment in New Zealand (£28 million) appear under the heading Direct Investment in Table XI, being undistributed profits, it can be seen that the action of compound interest is powerfully at work again. The gap between net foreign investment coming into this country year by year and of income payments due on account of the whole stock of investment is indeed narrowing, and if we take into account royalty and commission payments it will be seen that during the last two years Government borrowing has become necessary again, so as to be able to pay interest, dividends and royalties on private investment. But even if we do not charge royalty and commission payments directly to the cost of foreign investment in New Zealand, Table XII makes clear that New Zealand had to borrow during the period under review so as to make these payments:

TABLE XII

Foreign Investment in New Zealand 1949–58

(£ million)

Funds available:		
Liquidation of New Zealand held foreign assets—		
Exchange reserves	22	
Sale of investments	12	
	—	34
Net borrowing:		
Government	9	
Private	72	
	—	81
		115
Required for:		
Payment of public and private interest and dividends		72
Finance available for imports surplus		43
Which contains payments of royalties, etc., amounting to		26
Contribution of £81 million borrowing by Government and private sector to real imports, visible and invisible		17

Summary of Factual Part

Table XIII, which is appended gives a summary of the great periods of foreign investment in New Zealand. These periods can, as has been seen,

TABLE XIII

Summary of Foreign Investment in New Zealand 1840–1958

(Except for period 1940–48, which is in £NZ million, values in £ sterling million)

(1) Period.	(2) Foreign investment in New Zealand. Public.	(3) Private.	(4) Total.	(5) Foreign investment required for finance of payment of interest, etc. Import surplus.	(6) Public.	(7) Private.	(8) Total.	(9) Exchange reserves.	(10) Total requirements.	(11) Contribution of export surplus to requirements.
1840–1886	38	33	71	44	21	4	25	2	71	Nil
1887–1934	146	−28	118	Nil	196	44	240	35	275	157
1935–1948/49	−84 (£st. 69)	−27	−111	Nil	84	34	118	59 (£st. 42)	177	288
1949/50–1957/58	28 (19) *	84	93	43	8	64	72	−22	93	Nil
	143 †							57		

For Sources and notes to this table see Appendix II.

* £28 million is the gross increase of public debt during this period; £19 million represents the acquisition of foreign assets by Government and official institutions.

† Reconciliation of Government Debt as at March 31, 1958, with above figure:

	£ million.
Public debt as above	143
Less First World War debt cancelled	26
	117
Government debt not shown in public debt statement (from *Official Estimates of Balance of Payments*)	13
	104
Equals:	
Central Government debt	100
Local Government debt	4
	104

‡ Foreign-exchange reserves of the banking system as at March 31, 1958, were £50 million plus £7 million gold held by Reserve Bank.

be subdivided into four: the first dating from 1840 to 1887. This is a period when New Zealand imported real capital from abroad and built the basis for her foreign debt. The second great period extends from 1887 to 1934—strangely enough another forty-seven years. During that period New Zealand increased her debt because she would have been unable to pay her interest bill without borrowing. An outflow of private capital further increased the need for borrowing. The third period is that of the first New Zealand Labour Government and the Second World War—fourteen years from 1935 to 1949. During that period New Zealand reduced her debt substantially. The fourth and final period is the present one, when the growth of private foreign investment, outstripping that of growing overseas Government debt, is leading to a repetition of the situation which was present during the 1886–1934 period, when borrowing became necessary to find the means to remit interest on foreign investment overseas.

Part II. Comments

It has been assumed by some writers that young agricultural nations go through four typical stages: Immature-debtor stage, mature-debtor stage, new-creditor nation, mature-creditor nation.[1] The immature-debtor stage is one where there exists an import surplus. This stage was covered by the period 1840–86 in New Zealand's history. It is doubtful, however, if many young agricultural nations have ever been through the "mature-debtor stage." This stage, according to Samuelson, is one where "the balance of trade becomes favourable. But growth of dividends and interest payable abroad on past borrowing keeps the balance on current account more or less in balance. Capital movements are also about in balance, new lending just about cancelling off borrowing."[2] Such a stage has certainly never quite been reached by New Zealand. Between 1887 and 1934 interest on past borrowings regularly exceeded earning from export surpluses, and borrowing became necessary year by year.

That New Zealand's experience is by no means unique is borne out by John Knapp's important study on "Capital Exports and Growth" in the Economic Journal, September 1957. Knapp has shown that between 1850 and 1914 the United States, for instance, increased international debt by $3,000 million, but paid interest and dividends amounting in total to $5,800 million. Similar examples are given for Canada, Burma, Indonesia, the Gold Coast and Nigeria.[3]

Another principle which we may call in question is that investment in

[1] See, for instance, Paul Samuelson, *Economics*, third edition (New York, 1955), p. 620.
[2] *Ibid.* (slightly paraphrased).
[3] Knapp, *loc. cit.*, pp. 433 and 435.

under-developed countries should preferably take the form of equity capital.[1] This policy might have had some justification when economists expected a recurrence of the deflationary experience of the thirties. The inflationary situation of the post-war period, however, has reduced its weight. The heavier the interest burden on foreign investment, the greater is the likelihood of a country having to borrow to meet that interest burden. Once embarked on this slippery slope, the action of compound interest starts to work, and foreign investment tends to become a growing burden which is no longer compensated by the advantage of increased availability of real resources. Since the return on equity investment tends to be a multiple of the return on fixed-interest-bearing investment, specifically of Government borrowing, it seems to be advisable for a country to borrow on fixed interest rather than to allow foreign capital to take over equities.

A second point in favour of fixed-interest investment is that the burden of interest tends to lighten with inflation. New Zealand's payment of interest on Government debt has become extremely light. On the other hand, payments on equity capital tend to grow with inflation. If a country's internal policy is based on the maintenance of full employment in times of falling overseas prices the danger of the burden of profit remittances becoming unbearable in times of export recession is very great.

Finally, the best way to check the growth of service charges on debt is to reduce the debt. This is relatively easy with fixed-interest-bearing investments. On the other hand, investors who have entrenched themselves in particular economic activities which give scope for fuller employment of their metropolitan organisations and earn an attractive return are difficult to buy out. If such buying out is to be successful it will usually be at capital values much in excess of funds first introduced into the country, so that the capital burden of foreign equity debt tends to grow even without inflation, but even more so with inflationary conditions prevailing.

A third point of view which our description of foreign investment calls into question is the idea that New Zealand's growth in the past was financed by a net inflow of foreign exchange resulting from foreign loans.[2] If by

[1] Compare, for instance, League of Nations, *Economic Stability in the Post-war World*, Part II, Geneva, 1945: "We have suggested that the export of capital in the form of equity or direct, investments is preferable to foreign loans, since the yield of such investments will tend to vary with the general prosperity of the receiving country and therefore with its power to transfer" (p. 194). Also *International Monetary Fund Staff Papers*, D. Finch, "Investment Service of Under-developed Countries September," 1952: "From the cyclical standpoint a country can safely assume a considerably larger service of foreign indebtedness if it is on an equity basis than if it calls for fixed interest and amortisation payments" (p. 71).

[2] Compare, for instance, Reserve Bank Bulletin, May 1957, p. 86: "New Zealand is internationally, a debtor country, borrowing more than we lend. This has been true for the greater part of New Zealand development which has necessarily, in the earlier years particularly, depended largely on overseas loans and investments. As a counterpart to these borrowings we have built up in New Zealand many capital assets, such as roads, harbours and industries which contribute greatly to our productivity."

such a statement is meant that foreign capital in the form of foreign-owned firms has played a great part in New Zealand's development, little exception can be taken. This applies in particular to the period 1840 to 1887. During that period foreign investment in New Zealand helped the country both to supplement local savings and to finance imports. The higher level of production to which that investment raised the New Zealand economy enabled the country to finance later service charges. Had the early foreign investment not occurred in that crucial period of development the whole level of New Zealand exports and production and standard of living might have remained much lower.

But if the statement that New Zealand's growth *after* 1887 was financed largely by foreign investment is meant to imply that foreign and not New Zealand *real* savings have rendered possible the public and private capital works which are the backbone of this country's present productivity, such a statement is surely incorrect. New Zealand's foreign creditors were not forced to reduce the real resources available to them when they made loans to New Zealand. These resources were from 1887 onwards quickly replenished by a transfer of New Zealand surplus resources in the form of interest payments. When these transactions of remitting New Zealand surplus resources in the form of interest and having them returned in the form of loans, had been cancelled out, real savings had still to be found out of New Zealand incomes to finance the capital formation necessary for development.

This, of course, does not mean that—historically speaking—New Zealand could have been developed without technical foreign assistance. But this technical foreign assistance could have been, and was in fact, paid for out of the country's own external and internal savings. Neither does this mean that New Zealand could have been developed without building up a substantial foreign debt. It was in the nature of the financial apparatus of the early years of New Zealand's development that the payment of interest on foreign debt and the raising of funds for that payment were quite separate transactions. The Government did not raise loans to pay interest on debt. It taxed the public to obtain the funds for debt interest, and then, finding itself short of funds for capital works, borrowed overseas the amounts which it could not raise locally. Thus did it appear that public works were financed from foreign borrowing. This appearance veiled the essential fact that New Zealand financed her capital imports out of her own earnings, requiring foreign loans only in order to meet charges on loans previously incurred.

Not only did foreign investment not contribute any net real capital resources to New Zealand's development between 1887 and 1950, it positively harmed development. If the burden of interest on foreign borrowing becomes large relative to a country's exports and imports, the necessity arises to create an artificially large export surplus. By " artificially large " I understand a level of imports below what would correspond to the

propensity to import at full employment. If we assume a certain marginal propensity to import, this means that national income has to be reduced by the multiple which the marginal propensity to import bears to marginal national income. Thus, a reduction of imports by £5 million, given a marginal propensity to import of one-third, would require a reduction of national income by £15 million. Such forceful reductions were particularly noticeable during periods of falling exports, as was the case in the 1921 recession and the depression of the thirties. But fear of inability to meet charges or to repay debt on maturity cast a shadow over New Zealand's growth even between crises.

Thus while on the surface foreign investment may stimulate a country's development in certain fields, looking at it over a period of years, excessive foreign investment [1] leads to reduction of growth through its effect on the greater variability of the national income and through the element of excessive liquidity preference which it introduces in the international field.[2]

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[1] By "excessive foreign investment" I understand investment the service of which exceeds a country's earning capacity (= excess of visible exports over visible and invisible imports—exclusive of foreign debt service).

[2] Some aspects of the effects which are excessive foreign investment service ratio may have on a country's economy are analysed by David Finch, "Investment Service of Under-developed Countries," *International Monetary Fund Staff Papers*, September 1951.

APPENDIX I

Estimate of Foreign Interest Payments 1840 to 1914

Note: The Statistical Summary of the Colony of New Zealand (*Official Year-Books*, 1893 onwards) shows public debt as from 1862—prior to this no debt is shown, the first entry is £836,000 for 1862. It has been assumed that until 1900 (when accurate figures become available—see 1946 *Official Year-Book*) 90% of Government debt was raised overseas. Following Simkin, *The Instability of a Dependent Economy*, p. 42, interest rates have been assessed at 6% from 1860 to 1879. From 1880 to 1897 a rate of 5% has been estimated. After this a rate of 4½% has been applied. Foreign Local Debt is shown in *Year-Books* from 1891 onwards.

(£ million)

Year.	Central Government debt. Total debt.	Less 10% local debt.	Foreign debt.	Increase for year.	Local body debt.	Total foreign debt.	Total interest.
1862	0·8	0·1	0·7	0·7		0·7	0·04
1863	1·3	0·1	1·2	0·5		1·2	0·07
1864	2·2	0·2	2·0	0·8		2·0	0·10
1865	4·4	0·4	4·0	2·0		4·0	0·24
1866	5·4	0·5	4·9	0·9		4·9	0·29
1867	5·8	0·6	5·2	0·3		5·2	0·31
1868	7·2	0·7	6·5	1·3		6·5	0·39
1869	7·4	0·7	6·7	0·2		6·7	0·40
1870	7·8	0·8	7·0	0·3		7·0	0·42
1871	8·9	0·9	8·0	1·0		8·0	0·48
1872	10·0	1·0	9·0	1·0		9·0	0·54
1873	10·9	1·1	9·8	0·8		9·8	0·59
1874	13·4	1·3	12·1	2·3		12·1	0·72
1875	17·4	1·7	15·7	3·6		15·7	0·94
1876	18·7	1·9	16·8	1·1		16·8	1·01
1877	20·7	2·1	18·6	1·8		18·6	1·11
1878	22·6	2·3	20·3	1·7		20·3	1·22
1879	24·0	2·4	21·6	1·3		21·6	1·30
1880	28·2	2·8	25·4	3·8		25·4	1·27
1881	28·5	2·8	25·7	0·3	3·0	28·7	1·43
1882	29·4	2·9	26·5	0·8	3·3	29·8	1·49
1883	31·1	3·1	28·0	1·5	3·5	31·5	1·57
1884	32·2	3·2	29·0	1·0	4·0	33·0	1·65
1885	33·9	3·4	30·5	1·5	4·3	34·8	1·74
1886	35·7	3·6	32·1	1·6	4·9	37·0	1·85
							21·17
1887	36·8	3·7	33·1	1·0	5·0	38·1	1·9
1888	38·4	3·8	34·6	1·5	5·0	39·6	2·0
1889	38·7	3·9	34·8	0·2	5·0	39·8	2·0
1890	38·8	3·9	34·9	0·1	5·0	39·9	2·0
1891	38·7	3·9	34·8	—	5·1	39·9	2·0
1892	39·3	3·9	35·4	0·6	5·3	40·7	2·0
1893	39·8	4·0	35·8	0·4	5·4	41·2	2·1
1894	40·4	4·0	36·4	0·6	5·5	41·9	2·1
1895	43·1	4·3	38·8	2·4	5·5	44·3	2·2
1896	44·4	4·4	40·0	1·2	5·5	45·5	2·3
1897	45·0	4·5	40·5	0·5	5·5	46·0	2·0
1898	46·9	4·7	42·2	1·7	5·5	47·7	2·0
1899	47·9	4·8	43·1	0·9	5·5	48·6	2·1
1900	49·6	5·0	44·6	1·5	5·5	50·1	2·1
1901			44·6	—	5·5	50·1	2·1
1902			46·6	2·0	5·5	52·1	2·2
1903			48·4	1·8	5·5	53·9	2·3
1904			48·8	0·4	5·5	54·3	2·3
1905			50·6	1·8	5·5	56·1	2·4
1906			53·6	3·0	5·6	59·2	2·5
							42·6

Year.	Central Government foreign debt.	Local Government foreign debt.	Total foreign debt.	4½% interest.
1907	54·6	5·5	60·1	2·5
1908	54·6	5·3	59·9	2·5
1909	58·5	5·5	64·0	2·7
1910	61·8	7·0	68·8	2·9
1911	66·4	7·5	73·9	3·1
1912	68·2	7·0	75·2	3·2
1913	73·1	7·3	80·4	3·4
1914	82·9	8·8	91·7	3·9
				24·2

Appendix II

Notes on and Sources of Tables II–VIII and XIII

Public Debt: For public debt until 1900 see Appendix I; Breakdowns into local and foreign debt are available in *Official Year-Books* for public debt; for Local Body debt (which is always included in the tables) the first summary total broken down into foreign and locally raised debt appears in the 1921–22 *Official Year-Book*, p. 446, starting from 1900–20. Afterwards, *Year-Books* 1929, 1935 and 1940 have been consulted. In the balance-of-payments estimates in these *Year-Books* all values are given in sterling. Thus Table VII expresses the increase of public debt in sterling. On the other hand, Table XIII, which summarises the years 1935 to 1948/49 is expressed in New Zealand pounds, so that for purposes of comparison of Table XIII and Table VII it must be remembered that during that period £100 sterling = £125 New Zealand.

Private Investment: This item is a residue. It is calculated as the difference between funds available and funds required for interest payments, increased foreign reserves and possibly an import surplus and repayment of foreign public debt. For the period 1949–58 *Official Estimates of Balance of Payments* has been used.

Simkin has come to somewhat different results in his *Instability of a Dependent Economy*, p. 84, and also in his graphs on Chart 15 on page 83. The following is a comparison of his figures and mine:

	£ million.
Simkin:	
Simkin's private foreign outflow 1886–1902 (calculated by him)	17·8
Add my calculations on same basis for 1903–6 as per Appendix III	7·1
	24·9
Apportioned in Table III:	
£750,000 p.a. private interest payments for twenty years	15
£500,000 p.a. invisible imports (deducted from visible export surplus)	10
	25

It can be seen that Simkin shows no inward movement of private capital, which accords with the negligible difference shown in Table III.

However, for the period 1907–14 Simkin's figures differ more substantially. His figures are (private communication):

		£ million.
1907	Foreign outflow of . .	3·3
1908		3·6
1909		2·2
1910		5·9
1911		2·0
1912		4·4
1913		3·8
Total outflow		25·2
Add my calculation for 1914 as per Appendix III .		11·3
Foreign outflow as per Simkin		36·5

I have estimated:

	£ million.
£1 million private interest payments for 8 years . . .	8

and

£750,000 p.a. for invisible imports p.a.	6
	14

This leaves a private capital outflow of over £22 million according to Simkin, whereas my calculations account for an outflow of £13 million only (see Table IV). In other words, Simkin shows consistently a larger private foreign outflow during the period 1907–14. However, the principle of negative private foreign investment seems to be well established for the period by both sets of figures.

Interest on Public Debt: 1840–1913 see Appendix I. From 1914 to 1939 see *Official Year-Books*, 1935 (p. 191), 1941 (p. 196). From 1940 to 1958 statements of interest on foreign debt appearing annually in *Year-Books* have been used.

Private Interest, Dividends, etc.: Estimated at £100,000 p.a. until 1886; at £750,000 p.a. for the years 1887–1906; at £1 million per year until 1939. (The Balance of Payments Estimates in *Year-Book*, 1941, for instance, gives the estimate of £1 million on p. 197.) From 1940 to 1949 estimates from Reserve Bank Overseas Receipts and Payments; from 1950 to 1958, *Official Estimates of Balance of Payments*.

Exchange Reserves: 1840–86, estimate. 1887–1906 and 1907–19 from Table III appended to A. H. Tocker, "Australasian Monetary Standards," Economic Journal, December 1924, p. 574. Later years, *Official Year-Books*. In addition, the series "specie exports and imports" in the trade statistics (*e.g.*, 1946 *Year-Book*, p. 784) has been used.

Export Surplus: This is the difference between visible exports and imports as shown in *Year-Books*. Deducted from this surplus are invisible imports made up of freights, commission, travelling expenses, films, Government expenses other than imports and interest payments. Invisibles have been estimated at nil during the first period, at £500,000 p.a. during the next twenty years, at £750,000 p.a. from 1907 to 1919 and at £1 million from 1920 to 1939.

Taking the 1929 Overseas Balance of Payments estimates as an example (*Year-Book*, 1935, p. 192) the following items made up invisibles there:

	Net	
Freights	− 675,000	
Passage money and port receipts . .		+ 1,384,000
Migrants' remittances	− 75,000	
Tourists	−1,720,000	
Consular and other Government payments	− 400,000	
	−2,870,000	+ 1,384,000 = −£1·5 million

Or for 1933 the amounts would have been:

Freights	− 330,000	
Passage money, etc.		+ 810,000
Migrants	− 210,000	
Tourists	− 900,000	
Government	− 480,000	
	−1,920,000	+ 810,000 = −£1·1 million

It has been assumed that with smaller trade turnover prior to 1929 invisibles averaged £1·3 million.

From 1935 to 1948 *Year-Book* figures for the export surplus have been used as follows:

£NZ million
(1941 *Year-Book*, p. 196.)

Calendar year.	Export surplus	+ Lend-lease*	
1935–39 †	38·0		
1940	24·7		
1941	18·3		
1942	27·4	11·0	
1943	−23·4	27·0	
1944	− 8·6	22·0	
1945	26·5	7·0	
1946	29·7		
1947	0·8		
1948	19·3		
	152·7	+ 67·0	= 219·7

To this visible trading surplus have been added the following items (see *Official Year-Books*, 1944, p. 397, and 1947/49, p. 207):

Receipts from U.S. Personnel	20·0
Receipts from High Commissioner	68·9
	303·6
The following invisible imports have been deducted: commissions, donations, travelling expenses, film hire and £5 million for the years 1935–39	20·6
	255·0

* *Year-Book*, 1958, p. 298. † *Year-Book*, 1941, p. 196.

Appendix III

Calculation of Foreign Disinvestment 1902–14 (Simkin's Method)

(£ million)

	Exports Minus Imports	+ Borrowing	− Interest and Exch. Res.	= Capital outflow.
1903	2·9	1·8	2·3	0·7	1·7
1904	1·9	0·4	2·3	0·4	−0·4
1905	3·2	1·8	2·4	0·3	2·3
1906	3·7	3·1	2·5	0·8	3·4
	11·7	7·1	9·5	2·2	7·1

Note: This £7·1 million is the outflow calculated by Simkin's method. From this I have deducted £2·0 million (0·5 million p.a.) invisible imports and £3·0 million (0·75 million p.a.) dividend and profit remittances.

1907	0·5	0·9	2·5	0·7	1·2
1908	−1·2	−0·2	2·5	−3·8	−0·1
1909	4·8	4·1	2·7	−0·4	6·6
1910	5·4	4·8	2·9	5·9	1·4
1911	0·2	5·1	3·1	0·9	1·3
1912	1·0	1·3	3·2	−3·3	2·4
1913	1·2	5·2	3·4	0·3	2·7
1914	5·1	11·3	3·9	1·2	11·3
	20·0	32·5	24·2	1·5	26·8

Note: This £26·8 million is the outflow calculated by Simkin's method. From this I have deducted £6·0 million (0·75 p.a.) invisible imports and £8 million for dividend and profit remittances.

Sources as per Appendix II.

AUCTION PRICES: ESTIMATED AND REALISED[1]

THE degree of accuracy with which any group of " competent experts " can predict prices is of interest to economists if only because the predictive powers of economics is so often discussed. What is presented here is a comparison of estimated prices with realised prices for certain kinds of equipment at one auctioneer's sales over the period 1949–57. Auction sales are an especially severe test for price predictions; the random element in ealised prices is so large. Even for the fairly narrow range of equipment to which attention is confined here, and for sales located, as these are, at accessible places in the Home Counties, there are great variations in the types and amounts of equipment for sale and fluctuations in the number and composition of buyers.

The auctioneer who kindly allowed his catalogues to be scrutinised (with the original and finally frustrated purpose of compiling an index number of the auction prices of a few kinds of equipment) makes a practice of getting one (sometimes two) member(s) of his staff to estimate the price each lot may be expected to realise in forthcoming sales. The practical purpose of these estimates—and this must be emphasised—is to give guidance to the auctioneer on the condition of the equipment and thus on the appropriate price-level at which to ask for first bids. The estimates are therefore fairly conservative estimates of what, in the light of the results of recent sales, and of market conditions generally, each lot " ought " to realise. They are made by men experienced in selling and valuing equipment, but like all valuations, the purpose for which they are made is vital; if the purpose were different the valuations would be somewhat different.[2]

For the purposes of this investigation, where two preliminary estimates were available (in about 5% of the cases) the one nearest to the realised price was taken. Lots withdrawn on failure to make reserve prices have been ignored.

RELEVANCE TO THE VALUATION OF CAPITAL

The present data have some relevance to a wider problem. Economic statisticians, as the recent work of Goldsmith in the United States and Barna and Redfern in the United Kingdom bears witness, have, for a number of reasons, renewed an early interest in the measurement of capital.[3] In

[1] I am grateful to Professor W. E. Armstrong of Southampton University and Mr. J. A. C. Brown of the Department of Applied Economics, Cambridge, for helpful discussions.

[2] For a detailed elaboration of this and related points, see J. C. Bonbright, *The Valuation of Property* (New York: McGraw-Hill, 1937).

[3] See, for example, R. W. Goldsmith, " A Perpetual Inventory of National Wealth," *Studies in Income and Wealth*, Vol. 14 (New York: National Bureau of Economic Research, 1951). T. Barna,

this empirical work valuation is a first and crucial problem. All possible ways of valuing reproducible assets need not be rehearsed here. Only two are relevant. One is to take an asset's second-hand value. This is generally regarded as in practice (not, if second-hand markets were "ideal," in theory) an unsatisfactory procedure, since the thinness of second-hand markets for most assets makes data difficult to obtain and induces wide irregularities in prices. Most of the present data relate (deliberately) to types of equipment—lathes and milling machines—extensively traded second-hand. As will be noted again later, the variations in the realised prices of machines judged by the auctioneer's staff to be of much the same value are great. The data therefore go a little way (auctions are only a small rather special part of the second-hand market) to confirm the economic statisticians' mistrust of second-hand prices. But the data can also be regarded as throwing some light on a second procedure for valuing capital—valuation by "expert" judgment. A recent investigation of the capital employed in British manufacturing industry has made use of firms' valuations, often for fire-insurance purposes, of their assets. These valuations are—depending on a firm's size and current circumstances—more or less "expertly" arrived at.[1] Whilst it is unnecessary to discuss in full the criteria on which they are based or the techniques employed in making them, they embody an irreducible element of judgment: different valuers would arrive at different valuations. Only in an all-pervasive perfectly competitive market for assets of all ages, the market which can in theory be regarded as establishing ideal valuations, could experts' judgments be objectively tested. The market for most assets does not even approximate to this. Auctions have some of the necessary characteristics, but chance (to select this point again) plays in them too prominent a role in determining prices for them to provide entirely convincing tests even of "expert" valuations arrived at with the condition of auctions explicitly in mind. Nevertheless, from the broad point of view of the economic statistician, the present data are probably reassuring evidence of the "expertness" of "expert valuers."

The comparisons of the estimated and realised prices for milling machines and lathes are made in two double-logarithmic charts (A and B) and in two bivariate tables (I and II). On double-logarithmic charts a wide range of prices can conveniently be plotted and—more important—relative errors for all levels of estimated prices can easily be compared. From the tables (as from the charts) it can be seen that for each level of estimated prices enormous relative errors in the estimates are possible. Nevertheless, on the

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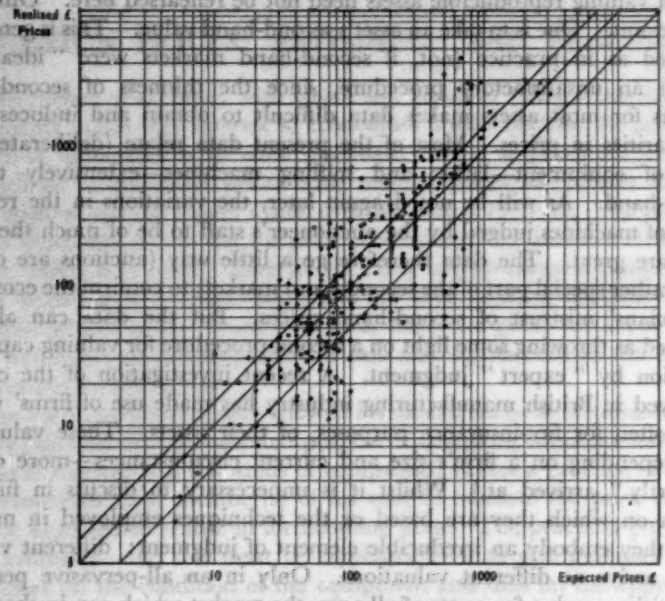
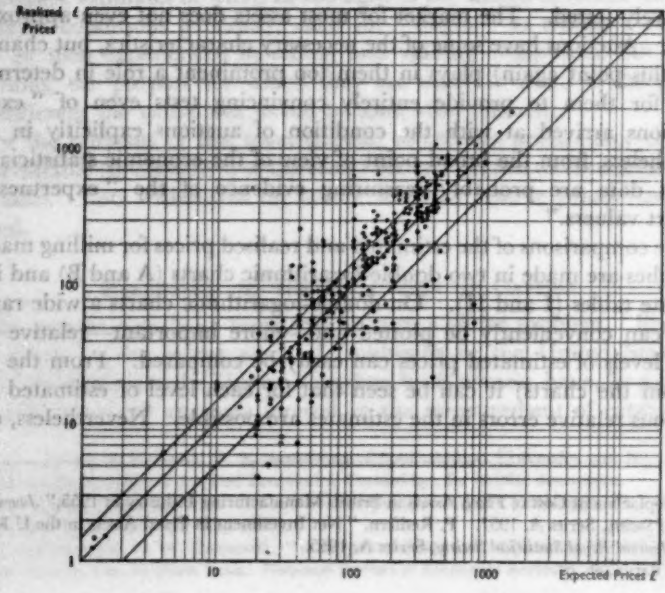
"The Replacement Cost of Fixed Assets in British Manufacturing Industry in 1955," *Journal Royal Statistical Society*, Series A, 1957. P. Redfern, "Net Investment in Fixed Assets in the U.K. 1938–1953," *Journal Royal Statistical Society*, Series A, 1955.

[1] T. Barna, *op. cit.*

A. MILLING MACHINES: EXPECTED AND REALIZED PRICES
(AUCTION SALES 1949–1957)



B. LATHES: EXPECTED AND REALIZED PRICES
(AUCTION SALES 1949–1957)



average, estimates fall only 16% [1] below realised prices for lathes and 34% [1] below for milling machines, and for both kinds of equipment about a third of the estimates are within 25% of realised prices and nearly two-thirds (60%) within 50%. Lines have been drawn on the charts to illustrate coincidence of estimated and realised prices and to enclose estimates within

TABLE I

Auction Sales 1949–57

Milling Machines

Estimated prices, £.	Realised prices, £.										
	0–99	100–199.	200–299.	300–399.	400–499.	500–599.	600–699.	700–799.	800–899.	900–999.	Total nos.
0–99	91	16	8	—	—	—	—	—	—	—	115
100–199	18	20	12	4	2	2	—	—	—	—	58
200–299	3	9	9	7	3	—	—	2	—	—	33
300–399	—	3	6	5	2	2	4	1	3	—	26
400–499	—	—	—	1	2	2	—	—	2	1	8
500–599	—	—	—	—	—	—	1	—	—	1	2
600–699	—	1	—	—	—	—	2	—	1	2	6
700–799	—	—	—	—	—	—	—	2	—	—	2
800–899	—	—	—	—	—	—	—	—	—	—	—
900–999	—	—	—	—	—	—	—	—	—	—	—
Total no.	112	49	35	17	9	6	7	5	6	4	250

50% of realised prices. (These lines are, of course, parallel but not equidistant from one another.)

The valuations of the auctioneer's staff are conservative in intent; one would therefore expect them on the average to fall short of realised prices. They do. Moreover (and this is a personal judgment), their error is—given all the chances of auctions—sufficiently small to suggest that in a less-volatile market and with more time and more compelling reasons for "accuracy," the auctioneer's staff could make quite a good job of predicting realised prices.

[1] These are derived from the arithmetic means of the percentages of "realised prices as a percentage of estimated prices."

	Milling machines.	Lathes.
Mean realised price	£327	£223
Mean estimated price	£223	£176
Standard deviation:		
Realised prices	£536	£254
Estimated prices	£357	£186

The double-logarithmic charts reveal the relationship between estimated and realised prices to be non-linear. The product moment correlation coefficients are therefore not entirely appropriate, but, for what they are worth, they are for milling machines +0·8 and for lathes +0·9.

The greater variation in estimated than in realised prices suggests, what is plausible, that the estimators when confronted with equipment of varying types, qualities and ages perhaps broadly classify it and have in mind for each class a comparatively narrow range of "normal" prices, around which realised prices in practice fluctuate widely. If this speculation is true another feature of the data perhaps suggests, what is again plausible,

TABLE II

Auction Sales 1949–57

Lathes

Estimated prices, £.	Realised prices, £.										
	0–99.	100–199.	200–299.	300–399.	400–499.	500–599.	600–699.	700–799.	800–899.	900–999.	Total nos.
0–99	107	9	3	—	—	—	—	—	—	—	119
100–199	11	24	16	6	—	—	2	—	—	—	59
200–299	1	6	11	5	6	—	—	—	—	—	29
300–399	—	3	2	13	6	7	2	1	—	—	34
400–499	—	2	—	4	4	4	4	—	2	—	20
500–599	—	—	—	—	1	1	—	—	2	—	4
600–699	—	—	—	—	—	—	2	1	—	—	3
700–799	—	—	—	—	—	1	—	—	—	—	1
800–899	—	—	—	—	—	—	—	—	—	—	—
900–999	—	—	—	—	—	—	—	—	1	—	1
Total no.	119	44	32	28	17	13	10	2	5	—	270

Note: 17 Milling machines and 5 lathes are unrecorded in the tables, as their estimated and/or realised prices fall outside the specified classes.

that conceptions of "normal" prices are rather unresponsive to market events of contradictory purport. There is a tendency for realised prices more commonly to exceed estimated prices when estimated prices are high (over £500) and to fall short of estimated prices when these are low (under £50). During most of the period 1949–57 there was a strong demand for the best second-hand lathes and milling machines, a demand which the estimators must have persisted in assessing conservatively. At the same time the demand for the cheaper machine tools (most of them, one may presume, of poor quality and obsolete type) was frequently weaker than expected. The auctioneer's staff try to sense the underlying trends in prices, but the fact that wide fluctuations around the trends are characteristic of auction sales rightly makes them slow to revise established notions. The ideal second-hand markets of theory, which some would claim to provide the best means of determining the valuations to place on capital, do not exist. But it may be a useful discipline for the expert valuers, on whose

valuations we often need to rely, to try to retain a sense of the "normal" prices and the underlying trends in "normal" prices at the imperfect second-hand markets which do exist. So far as the present evidence goes, they can do this with a fair measure of success.

Runs in Estimated Prices

The discrepancies between estimated and realised prices are not, on a closer examination, completely unsystematic. Similar data to those for milling machines and lathes were collected for three separate auction sales (held respectively in 1949, 1952 and 1957) of industrial equipment of widely varying kinds. So far as they go—they almost wholly relate to lots estimated to have been worth less than £100—these data broadly confirm the results for lathes and milling machines already detailed, with the one exception that the realised prices of the cheapest lots (as estimated) are not predominantly below the estimated prices; rather the contrary. They also exhibit—and this is the immediate point—a strong tendency for overestimates and underestimates to go in runs.[1] One may plausibly surmise that this clustering is (largely) due to the similar character of successive lots: if the price of the first lot is more (or less) than was expected, the same is likely to be true for the other lots. Perhaps also "moods" of buoyancy and depression amongst bidders can follow one another at a single sale as they distinguish different sales. Interestingly enough there is, in the data on lathes and milling machines, some evidence best interpreted perhaps as showing how different sales can be good, bad and indifferent. If the division of that data into sales is ignored (usually about six machines are up at each occasion) the same clustering is strongly exhibited in the first three years (1949–51), but not at all in the last three years (1955–57) of the period covered. Is the explanation that in the first period, when the demand for second-hand machines was on the whole extraordinarily vigorous, sales quite commonly took on and sustained either a markedly (and unexpectedly) buoyant or a comparatively depressed character, whereas, in the second period, when the demand for second-hand machines had become humdrum again an underestimate or overestimate in what one lathe or milling machine would realise at a forthcoming auction implied nothing as to the direction of the error in the estimate of what the next similar machine for sale would realise? This seems a plausible speculation. In the earlier period, in addition to the dealers and other regular purchasers of second-hand equipment, there would probably be numerous buyers, normally very unlikely to attend auctions, who then attended them from time to time and made the

[1] The numbers of runs for the three sales are 5·3, 6·1 and 3·3 standard deviations below the numbers to be expected if the direction of error of one estimate was independent of the direction of error of the next. See W. A. Wallis and H. V. Roberts, *Statistics. A New Approach* (Glencoe, Illinois: The Free Press, p. 570).

composition of the buyers from sale to sale more than usually unpredictable and varied.

Summary

The data presented here indicate the volatility of prices of two important items of capital equipment at auction sales and how, despite this, knowledgeable men can, all in all, make fairly good predictions of the prices which will be realised. This is, as far as it goes, evidence of the soundness of " expert " valuations of capital equipment reassuring to the economic statistician who is interested in the measurement of capital and to whom such valuations are a possible source of data. The data also suggest rather speculative hypotheses about the character of auction sales. For single sales overestimates and underestimates of realised prices go in runs. This phenomenon may be partly a consequence of the mass psychology of bidders. It seems likely too that when the demand for second-hand industrial machinery is in general high, sales may be unexpectedly good or unexpectedly poor more frequently than when demand is more normal.

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SOME FACTORS INFLUENCING SHARE PRICES[1]

I. Introduction

The part that security prices play in channelling the flow of capital into various industries and firms is often stressed. In recent years there have been a number of American studies of the quantitative influences of the forces which determine these prices,[2] but our knowledge of British security prices, apart from the recent work of Morgan and Taylor,[3] is seriously deficient in this respect. It is the purpose of this paper to alleviate this deficiency by presenting some estimates of the influence of dividends, undistributed profits and company size on share prices obtained from five cross-sectional samples of equities quoted on the London Stock Exchange between 1949 and 1957. It is perhaps useful to stress at the outset that such an analysis is concerned to explain why shares of different companies are at different levels at one time, and not to explain why the whole market is higher in one year than in another.

In spite of the differences in methodology, there are similarities between the results obtained in this paper and some of those obtained in the American studies. For example, Durand's work on bank share prices seems to indicate that the proportional effect of dividends on share prices is greater than the corresponding proportional effect of retentions. Johnson, Shapiro and O'Meara have found that a unit of dividends has a greater effect on prices than a unit of undistributed profits, and, in some cases, that retentions have no significant part to play in the analysis. These conclusions are similar to those reported in this paper. Furthermore, Durand found that the influence of growth was not consistently significant and, although a

[1] This paper reports on a study undertaken at the Department of Applied Economics, Cambridge, at the suggestion of Mr. Nicholas Kaldor. I am particularly indebted to Mr. W. B. Reddaway, Director of the Department, to Messrs. S. F. Kaliski and T. A. B. Corley, who, at different stages, were my colleagues on this project, and for assistance with the large volume of computing to Dr. L. J. Slater and to the computing staff at the Department under the direction of Mrs. E. M. Chambers. Earlier versions of this paper were read to the XIXth European Meeting of the Econometric Society, Luxemburg, August 1957 ("An Econometric Approach to the Analysis of Stock Exchange Prices," *Econometrica*, Vol. 26, 1958, pp. 455–8), and to the Research Seminar in Quantitative Economics, University of Michigan, October 1958. My thanks are finally due to the last-mentioned institution for the diagrams and for secretarial assistance and computing facilities during the final stages of preparation of this paper.

[2] For example, D. Durand, *Bank Stock Prices and the Bank Capital Problem*, National Bureau of Economic Research (New York, 1957); *idem.*, "Bank Stocks and the Analysis of Covariance," *Econometrica*, Vol. 23, 1955, pp. 30–45; O. Harkavy, "The Relation between Retained Earnings and Common Stock Prices for Large Listed Corporations," *Journal of Finance*, Vol. 8, 1953, pp. 283–97; L. R. Johnson, E. Shapiro and J. O'Meara, "Valuation of Closely Held Stock for Federal Tax Purposes: Approach to an Objective Method," *University of Pennsylvania Law Review*, Vol. 100, 1951, pp. 166–95.

[3] E. V. Morgan and Cynthia Taylor, "The Relationship between Size of Joint Stock Companies and the Yield of their Shares," *Economica*, New Series, Vol. XXIV, 1957, pp. 116–27.

different measure of growth is used here, a similar conclusion is reached. However, there are some differences. For example, in the American studies the estimates were quite unstable from year to year, whereas the estimates in this study appear to be fairly stable.

In the studies by Durand and by Johnson, Shapiro and O'Meara non-linear functions were used to explain prices. The first model reported in this paper uses a linear combination of dividends and undistributed profits to explain prices [1] and a brief, but by no means exhaustive, justification for this action is given in Section II. This discussion also provides a transition from well-known economic theory to the practical case examined in this paper.[2]

A discussion of estimation procedure together with practical difficulties is given in Section III. In Section IV the results are discussed, followed, in Section V, by an examination of two extensions of the model. The more successful of these introduces company size as a multiplicative term, and the results support the conclusions reached by Morgan and Taylor. The conclusions are summarised in the final section.

II. The Model

In a perfect market with perfect certainty the value of a security would be the sum of discounted future returns. But in reality the capital market is imperfect and uncertainty prevails. Each of these factors will influence price.

So far, economists have not developed a model which satisfactorily accounts for uncertainty. But lack of general agreement here need not be a serious drawback to the investigator who is primarily concerned with the relative advantages of following one course of action rather than another. In these circumstances the problem reduces to formulating a model which takes account of the relative merits of purchasing particular shares. For example, the model first outlined by Hicks,[3] and later developed by him and other writers,[4] requires the use of moments of the probability distribution

[1] The model used is thus similar to that used by Harkavy (*loc. cit.*), though he was primarily interested in time series analysis.

[2] Some readers may simply be content to accept as inherently plausible the idea that the price of a share is broadly explained by adding together the capitalised value of the last year's dividend and the capitalised value of the latest year's undistributed profit per share (using different capitalisation factors). If so, they need only note the equation of the model, given on p. 124, and can then pass straight to Section III.

[3] J. R. Hicks, "The Application of Mathematical Methods to the Theory of Risk," Paper to the 3rd European Meeting of the Econometric Society, Leyden, 1933, *Econometrica*, Vol. 2, 1934, p. 195.

[4] J. R. Hicks, *Value and Capital*, 2nd edition (Oxford, 1946), Part III, especially pp. 124–7; H. Markowitz, "Theories of Uncertainty and Financial Behavior," Paper to the Winter Meeting of the Econometric Society, Chicago, 1950, *Econometrica*, Vol. 19, pp. 325–6; *idem.*, "Portfolio Selection," *Journal of Finance*, Vol. 7, 1952, pp. 77–91; J. Marshak, "On Investment," Paper to the 5th European Meeting of the Econometric Society, Namur, 1935, *Econometrica*, Vol. 5, 1937, pp. 91–3.

of possible future returns yet provides no means of assessing their value.[1] In a cross-sectional analysis, however, this difficulty may be avoided so long as it is plausible to assume that particular moments are correlated with one or more known measurable variables. This point may be illustrated by considering briefly the effects of currently declared dividends and undistributed profits on people's estimates of the distribution of future returns.

If the Keynesian view of market psychology is accepted, investors will assume, in the absence of specific information about the future, that the current state of affairs will continue indefinitely.[2] In the case of dividends, this view is not as naïve as it might first appear. Dividends are the shareholders' income and are indicative at least of a firm's current profitability. Furthermore, it is observable that dividends vary less over time than profits, directors tending to distribute only what they think can be maintained. Lintner has suggested that this observation indicates that dividends are " the primary and active decision variable in most situations," being determined by essentially long-run considerations.[3] If this is so, current dividends provide a penetrating summary of a company's potentialities, and as such are indicative of its future expected dividends.

The amount of profit currently retained provides a fund from which a company can exploit innovation and develop new markets. If current retentions are held in liquid form they will always be available in the future, both to increase dividends and to act as a cushion against any unsuspected decline, provided that they are devoted neither wholly to one purpose nor wholly to the other.

According to Steindl[4] and Kalecki,[5] undistributed profits provide an inducement to carry out projects that might be deferred or even abandoned if it were necessary to approach external financiers. Such an increase in earning capacity, without an increase in nominal capital, is likely to raise the future dividend on shares. In any case, the larger the current level of undistributed profits, other things being equal, the less is the risk of a fall in future dividends if resort to the capital market should prove necessary to obtain funds for expansion.[6] Retained earnings may be regarded, therefore, both as an insurance against future dividends falling lower than the current one and as an investment in higher future returns at the expense of a lower current return. In this sense the relative levels of undistributed profits of different companies indicate not only relative dividend potentialities of companies but also the relative likelihood of variations in future dividends.

[1] For a summary and criticism of various theories of asset valuation under uncertainty see F. Modigliani and M. H. Miller, " The Cost of Capital, Corporation Finance and the Theory of Investment," *American Economic Review*, Vol. XLVIII, No. 3, June 1958, pp. 261–97.

[2] See J. M. Keynes, *The General Theory of Employment, Interest and Money* (London, 1936), Chapter 12, Section IV.

[3] J. Lintner, " Distribution of Incomes of Corporations among Dividends, Retained Earnings and Taxes," *American Economic Review*, Papers and Proceedings, May 1956, pp. 97–113.

[4] J. Steindl, *Maturity and Stagnation in American Capitalism* (Oxford, 1952), Part II.

[5] M. Kalecki, *Theory of Economic Dynamics* (London, 1954), Part 4.

[6] *Ibid.*, Chapter 8, especially pp. 93–4.

The discussion so far may be summarised symbolically as follows:

$$p = f(d,u,v)$$

where p = price of the share;
d = last declared dividend per share;
u = last declared undistributed profits per share;
v = a residual term summarising the effect of all other relevant variables.

As a first approximation, attention is concentrated on dividends and undistributed profits as independent variables. The discussion that follows considers in turn the form of the function and the nature of the residual term.

It is informative to consider the form of the function by referring to the analogous problem of valuing a business. The value of a business is either the market value of its assets or the capitalised value of its current profits. These two methods may be combined, for purposes of exposition, into a single formula:

(1) Value = Capitalisation of current profits + Value of assets in excess of capital value of profits.

If capitalised profits are less than the value of assets the value of the business is given by the latter. If the alternative is true the value of the business is the capitalised value of profits, or

$$V = YP$$

where V = value;
Y = capitalisation factor;
P = profits.

In the case of equity shares, profits are composed of two parts: dividends and retentions. In general, the share price will be a homogeneous, linear function of the two components of profits,[1] or

$$(2) \qquad p = \alpha_1 d + \alpha_2 u + v$$

α_1 and α_2 may be thought of as "the capitalisation factors" applying to dividends and undistributed profits respectively.

It is necessary for practical purposes to introduce an arbitrary restriction to exclude unprofitable cases from the analysis. This is

$$(3) \qquad d > 0;\ d + u \geqslant 0$$

III. Estimation Procedure

The residual v in (2), as mentioned above, reflects the fact that dividends and retentions are not alone sufficient to explain all of the observed variation

[1] p, d and u are measured in shillings. They were computed from the company records issued by Moody's Services to their subscribers. These accounts give earnings and dividends, as percentages of nominal capital. No distinction has been drawn between final payments of dividends and other labelled as "bonus" or "interim." Profits were taken net of depreciation as charged in the accounts. Both profits and dividends were treated as gross of tax.

in prices. In so far as the variables excluded produce systematic effects on prices, two possibilities are open. If the additional effects can be allowed for, these can be introduced into the equation. Alternatively, groups of shares may be considered separately, the groups being selected such that the additional effects on prices are likely to be roughly constant over all observations.

If the number of shares on the market is relatively small, large fluctuations in prices are likely to occur, since the market for these shares will be more imperfect than that for the shares of other, larger companies. Such fluctuations are irrelevant to valuations based on dividends and undistributed profits, so that, unless some allowance can be made for these imperfections, the analysis should refer only to shares for which there is a ready and active market.

Another source of systematic variation will arise from variations in the market's view of prospects in particular industries. By selecting only the shares of companies within a particular industry, this source of variation is greatly reduced. A pair of capitalisation factors would then apply to all companies within an industry, but would vary between industries and over time.

A possible procedure would be first to select shares on an industry basis and then to eliminate shares for which there is no ready market. This would involve an industry classification and an arbitrary test of marketability. Alternatively, samples could be chosen across industries from a population of well-known, active shares. A difficulty with the former procedure is that in order to obtain samples of reasonable size it might be necessary to extend the industry definition and to relax the criterion of marketability. The sample would then be treated as homogeneous, whereas significant disturbances still remain in the data. With the second alternative, although the sample may be drawn from shares for which there is an almost perfect market, the between-industry effect may be sufficiently large to upset the analysis.

Preference has been given here to the method of selection based on an industry classification. Four samples selected on this basis have been examined.[1] But, in order to examine the possible advantages of the alternative method, one sample of well-known, active shares has been analysed.[2]

It is the usual practice for companies to declare more than one dividend a year and, even within one industry, there is no uniformity as to the time of closing accounts or the timing of their publication. If an interim dividend has been declared, share valuation will be based on full information about the last financial year and partial information about the current year. If some companies have declared interim dividends and others have not the prices of the former will be based on more up-to-date information than those of the latter, and it is not easy to apply the analysis. Accordingly, prices

[1] A description of these samples and their method of selection may be obtained on application to the Department of Applied Economics, 7 West Road, Cambridge.

[2] Cf. L. R. Johnson, E. Shapiro and J. O'Meara, *op. cit.*, p. 186.

were selected on particular dates within the limits that all firms had both published their previous year's financial results and not yet declared their next interim dividend.

When an issue of shares was made, either between the date of closing the accounts and the date when prices were taken, or during the previous financial year, an adjustment was applied to the declared levels of dividends and earnings to take account of the peculiarities of the issue.

Variations in prices are larger, in shillings, for shares with a higher dividend, because the price is roughly proportional to the dividend, and in the nature of things it is *percentage* variations which matter in the market, not shillings per share irrespective of price. In consequence the estimates of the parameters α_1 and α_2 obtained by applying least squares directly to (2), although unbiased, are not the most efficient available. To improve efficiency it is necessary to give equal weight to shares with very different prices and dividends which can be done by transforming (2), for estimation purposes, into

$$\frac{p}{d} = \alpha_1 + \alpha_2 \frac{u}{d} + \epsilon \tag{4}$$

where $$\epsilon = \frac{v}{d}$$

In economic terms, we are considering the number of years' purchase of dividends as a function of the number of times retentions " cover " dividends.

A further problem that arises when variation in the dependent variable is large is that high correlation is consistent with substantial proportional errors. Thus correlation between observed and explained prices (*i.e.*, the multiple correlation between p, d and u) will usually be high because the variation in prices is very high, but for any particular share the percentage error in the estimate of price may be large. Some check on the goodness of fit is consequently desirable, and here an unconventional, but nevertheless meaningful, statistic S is used, where

$$S = \frac{1}{n} \Sigma \left| \frac{p - p^*}{p} \right|$$

in which p^* = estimated price;
n = number of observations;
S will represent the average percentage error involved in estimating prices.

IV. Results

The parameters α_1 and α_2 have been estimated, using the transformed equation (4), for each year from 1949 through 1957 for all samples. These estimates, together with associated statistics, are set out in Tables I–V.

The five samples are as follows: [1] a sample of 28 brewery company

[1] I am grateful to T. A. B. Corley and S. F. Kaliski, who prepared some of the information for the sample of woollen shares and the sample of brewery shares respectively and have kindly allowed me to make use of their results.

shares, 33 shares of companies in the electrical-goods industry, 27 shares of retail stores, 29 shares of companies in the woollen industry and a cross-sectional sample of shares from all industries, composed entirely of large companies and consisting of 48 shares. These samples will be known hereinafter as brewing, electrical, stores, wool and large companies respectively.

In considering these results, it is important to remember that the four industries have different characteristics and that there have been variations in government policy during the period. At the beginning of 1948 a voluntary dividend restraint was introduced which was maintained under threat of legislative action until the change of government in November 1951. In these circumstances dividends per share were unlikely to increase in the immediate future, although there remained the possibility of a fall in dividends. Where a fall was unlikely, the influence of undistributed profits on future dividends was likely to be more distant and less certain than it would have been in the absence of dividend restraint. Where a fall was likely, retentions would possibly have been important as an insurance against such a fall.

Table I gives the estimates a_1 and a_2 for the four industrial samples[1] for the period 1949–57 together with their standard errors, shown in parenthesis below each estimate. In the right-hand section of the table two measures of the goodness of fit are given, namely S, which has been defined above, and r^2, the square of the correlation between p/d and u/d. The latter indicates the proportion of variation in the number of years' purchase of dividends, or p/d, explained by variations in " cover," that is u/d.

In all cases a_1 is greater than a_2, *i.e.*, the capitalisation factor applied to dividends is greater than that applied to undistributed profits. Indeed, this is putting it very mildly: a_1 is always more than twice a_2, and in some cases the amount contributed by retentions to the explanation of price is negligible. Table II shows the relative influence which £1 of undistributed profits appears to have had on share prices compared with that of £1 paid out in dividends.

This is similar to the result of Johnson, Shapiro and O'Meara, who found that the influence of a unit of dividends was always greater than the influence of a unit of retentions, though, in their case, a considerably larger proportion of results indicated that retentions had an insignificant effect.

The coefficients within any one sample show a tendency, for all samples except stores, for a_1 to decrease and a_2 to increase over time. This suggests that variations between companies in dividends alone were sufficient to explain the relative prices of their shares in (say) 1950, whereas the consideration of undistributed profits along with dividends became of significant importance towards the end of the period. This is precisely the pattern suggested above, namely that the influence of undistributed profits would be smaller under dividend restraint than in its absence.

[1] Greek letters are used to represent parameters and Roman letters for corresponding estimates.

TABLE I

Estimates for the Four Industrial Samples, 1949–57 *

Year.	Capitalisation Factor for Dividends. a_1.				Capitalisation factor for Undistributed Profits. a_2.				Goodness of fit.			
	Brewing.	Electrical.	Stores.	Wool.	Brewing.	Electrical.	Stores.	Wool.		Brewing.	Electrical.	Stores.	Wool.
1949	18·59 (±0·57)	18·20 (±1·30)	11·23 (±1·20)	13·96 (±1·25)	1·16 (±0·30)	0·20 (±0·34)	2·51 (±1·03)	0·47 (±0·36)	r^2	0·372	0·011	0·193	0·060
									$S\%$	6·45	26·23	24·93	21·33
1950	14·74 (±0·87)	16·68 (±1·28)	10·89 (±1·33)	12·19 (±1·22)	0·84 (±0·64)	1·01 (±0·33)	2·49 (±0·91)	0·66 (±0·30)	r^2	0·061	0·228	0·231	0·153
									$S\%$	12·76	17·58	24·34	20·84
1951	14·46 (±0·87)	17·12 (±0·91)	17·77 (±1·50)	12·84 (±1·03)	2·20 (±1·03)	1·01 (±0·23)	1·60 (±0·92)	0·44 (±0·22)	r^2	0·278	0·378	0·108	0·129
									$S\%$	12·19	15·25	25·97	20·10
1952	12·52 (±0·82)	13·34 (±0·73)	10·20 (±0·87)	9·30 (±0·79)	1·74 (±0·73)	0·90 (±0·17)	0·73 (±0·70)	−0·14 (±0·33)	r^2	0·179	0·467	0·341	0·006
									$S\%$	11·26	14·40	24·88	25·51
1953	14·02 (±0·69)	13·74 (±0·68)	14·01 (±0·99)	12·90 (±0·66)	1·74 (±0·51)	1·42 (±0·23)	1·37 (±0·23)	−0·20 (±0·24)	r^2	0·308	0·552	0·115	0·024
									$S\%$	10·02	12·87	23·87	23·02
1954	12·99 (±0·68)	16·63 (±1·30)	15·37 (±1·44)	9·97 (±1·32)	3·34 (±0·59)	3·05 (±0·56)	2·61 (±1·15)	1·60 (±0·69)	r^2	0·554	0·491	0·170	0·169
									$S\%$	9·15	14·49	23·35	23·41
1955	13·40 (±1·10)	13·70 (±0·87)	12·91 (±1·77)	7·97 (±0·60)	4·19 (±0·60)	4·71 (±0·36)	4·75 (±1·59)	1·89 (±0·37)	r^2	0·429	0·844	0·262	0·491
									$S\%$	12·40	7·80	24·54	13·91
1956	11·49 (±0·76)	10·26 (±0·82)	11·14 (±1·16)	8·19 (±0·57)	1·29 (±0·65)	3·76 (±0·33)	1·54 (±1·02)	1·25 (±0·39)	r^2	0·133	0·811	0·084	0·279
									$S\%$	10·35	13·83	18·96	18·73
1957	11·56 (±0·55)	10·87 (±1·13)	14·90 (±2·04)	8·20 (±0·61)	1·73 (±0·52)	4·77 (±0·49)	2·90 (±1·85)	1·98 (±0·37)	r^2	0·303	0·767	0·090	0·521
									$S\%$	7·92	17·12	23·24	17·27

* Observations were taken as follows: breweries in February of each year; electrical and stores in August of each year; wool in May of each year.

Note: S gives the average percentage error in estimating prices from the formula $p^* = a_1 d + a_2 u$.

TABLE II

Ratio of the Effect on Share Prices of Undistributed Profits to that of an Equal Sum Paid Out in Dividends

Year.	Brewing.	Electrical.
1949	0·062 (±0·017)	0·011 (±0·019)
1950	0·057 (±0·046)	0·061 (±0·024)
1951	0·152 (±0·056)	0·059 (±0·016)
1952	0·139 (±0·066)	0·067 (±0·016)
1953	0·124 (±0·042)	0·103 (±0·021)
1954	0·257 (±0·057)	0·183 (±0·046)
1955	0·313 (±0·092)	0·345 (±0·046)
1956	0·112 (±0·059)	0·366 (±0·051)
1957	0·150 (±0·048)	0·439 (±0·076)

For the brewing and electrical samples, the explanation of prices is generally better than for the other samples. In this connection it is interesting to note that the electrical sample has, more often than not, higher correlation than the brewing sample, but that S (the average percentage error) is usually higher for the former. An explanation of this pecularity may be made in the following terms.[1] The market probably treated breweries as a fairly homogeneous, stable group in which dividends were not likely to change much and the prospect of change did not vary much from company to company, so that p/d does not vary greatly between companies. The relatively low value of r^2 shows that undistributed profits are not very good at explaining these small variations in p/d, but a poor explanation of a comparatively unimportant item does not matter very much, and S shows that the explanation of *prices* is quite good. With the electrical shares, on the other hand, the market regarded the prospects of a change in dividends as *both* large *and* very variable in size and direction from company to company, so that p/d shows large variations. Variations in undistributed profits explain quite a large proportion of these, but the unexplained part remains important, and the price estimates still have sizeable errors as a result.

The difference in meaning between r^2 and S, and in the forces affecting prices of breweries and electricals, can be seen more clearly in Figs. 1 (A) and 1 (B). Each diagram is made up of two parts. In the upper section, observations have been arranged in ascending order of p/d, shown on the vertical scale, with each unit on the horizontal scale representing a particular share. The continuous line joins the observed values of p/d, whereas the broken line joins the calculated values. The lower diagram gives the discrepancies betweeen observed and calculated values. In each diagram the mean value of p/d is shown, and this indicates what the calculated value of p/d would have been for each company had dividends alone been used to explain prices.

Comparing Figs. 1 (A) and 1 (B), it is readily seen that the variation

[1] I am grateful to Mr. W. B. Reddaway for this and other suggestions relating to this section.

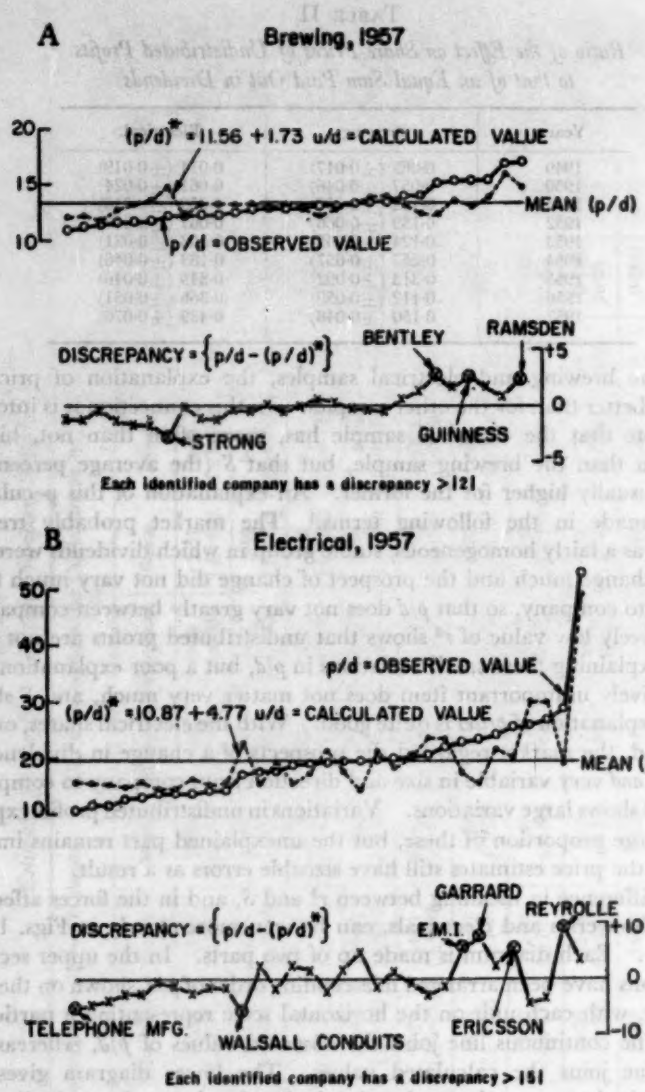

FIG. 1

Note: For the electrical sample in 1957 there are only 31, and not 33, observations, two shares being excluded from the analysis for this year which are included for the rest of the period. One company (Brush) was absorbed into another organisation in 1957, and its shares were therefore not quoted at the time of observation. The other (Revo Electric) did not obey condition (3).

in p/d for breweries is very much smaller than the corresponding variation for the electrical sample.[1] It follows that the mean of p/d is a more successful estimator of years' purchase in the case of breweries than for the electrical shares. Introducing u/d, the calculated values of years' purchase are improved for both samples, but much more in the case of electrical goods; this improvement is shown by the fact that for most companies the distance between the actual and computed values (*i.e.*, between the continuous line and the broken one) is less than the distance between the actual value and the sample mean (the horizontal line). The improvement is particularly striking for the right-hand end company (C. A. Parsons) on the electrical graph, whose high price in relation to the dividend is largely explained by the high undistributed profits.

Despite the fact that undistributed profits do more to explain the variations in p/d for electricals than for breweries, however, it is not surprising to find that errors in the explanation of *prices* are greater for electricals than the corresponding errors for breweries, simply because the use of the mean of p/d gives a relatively close estimate for breweries to begin with. Thus although variations in u/d explain a greater proportion of the variability in p/d for electrical shares compared with breweries, the explanation of prices is still better for the latter. It follows that r^2 may be interpreted as a measure of the *improvement* in the explanation of prices, using both dividends and retentions, over the simple method of multiplying the mean of p/d by the dividend—but gives no guidance on the size of errors which remain. On the other hand, S shows how good the estimates of prices based on dividends and retentions will be, without throwing any light on their superiority over the simple method.

For the sample of stores the estimate of the influence of undistributed profits is often unreliable, and the value of r^2 is consistently low. This is also true of the woollen sample until 1953. Indeed, in 1952 and 1953 a_2 is negative, although in each case the estimate is quite unreliable and could well be positive.

Even in these cases, Table III shows that a regression of prices as such on dividends, or on dividends and undistributed profits per share, would have yielded quite high values of r^2. This table must serve mainly as evidence of the importance of the warnings given in Section II, but it enables one to set out some results in a familiar way. In, for example, 1955 the average brewery share was selling at 17·2 years' purchase of dividends, and the average electrical share at 23 years' purchase of dividends.[2] This way of explaining share prices accounts for 66·3% of the observed variance in the former case and 63·0% in the latter case. For breweries it is better to take 13·4 years' dividends and 2 years' of current retentions (Table I), and this

[1] The scale used in Fig. 1 (A) is twice as large as that used in 1 (B).

[2] In 1955 $a = 17{\cdot}2$ for breweries and 23·0 for the electrical sample where a is the least-squares estimate of α in $p = \alpha d + r$, r being a residual term.

increases the amount explained to 77·8% (Table III). For electrical companies it is better to take 13·7 years' dividends and 4·7 years' of retentions (Table I), which increases the amount explained to 95·9% (Table III).

TABLE III

The Proportions of the Variances of Prices Explained for the Four Industrial Samples in 1950 *and* 1955

Sample.	Year.	Independent variables. Dividends alone. d.	Dividends *and* undistributed profits. d, u.
Brewing	1950	0·844	0·861
	1955	0·663	0·778
Electrical	1950	0·857	0·904
	1955	0·635	0·959
Stores	1950	0·700	0·778
	1955	0·736	0·808
Wool	1950	0·688	0·818
	1955	0·594	0·765

The results for the sample cutting across industries are given in Table IV. Correlation is always low and the average error S always high relative to the corresponding statistics for breweries and electrical companies and the latter part of the woollen sample.

TABLE IV

Estimates for the Sample of Large Companies, 1949–57

Year.	a_1.	a_2.	r^2.	S%.
1949	17·12 (±0·93)	0·71 (±0·32)	0·097	20·82
1950	16·54 (±0·98)	1·09 (±0·32)	0·205	21·57
1951	16·54 (±1·24)	1·70 (±0·12)	0·299	20·95
1952	14·54 (±1·03)	0·37 (±0·30)	0·032	23·77
1953	13·53 (±1·15)	2·12 (±0·46)	0·316	22·99
1954	16·56 (±1·50)	3·41 (±0·93)	0·227	24·96
1955	16·67 (±2·31)	3·22 (±1·29)	0·119	32·26
1956	13·34 (±1·71)	2·17 (±0·85)	0·125	29·62
1957	17·02 (±1·53)	0·77 (±0·83)	0·018	33·00

Note: a_1 and a_2 a are again the capitalisation factors for dividends and undistributed profits respectively.

A comparison of the estimates in Table IV with those in Table I does not indicate that there is any clear advantage to be gained from using sample selection based on industry classification, since the estimates in Table IV, in terms of reliability and goodness of fit, are generally comparable with the corresponding estimates for wool and stores. It will be demonstrated later,

however, that a considerable proportion of the residual variability in the samples of stores and woollen companies can be explained by a factor which does little to improve the results for the large companies. Then the explanation of prices becomes consistently better for samples based on industry classification and provides a basis for preferring this method of sample selection.

Although the parameter α_1 has been described above as showing the "capitalisation factor" for the latest dividend which is included in the price, it is not, of course, the same thing as a Stock Exchange operator would understand by the "number of years' purchase" of the dividend, nor is its reciprocal the same as the familiar dividend yield which appears in market reports. The reason is that the Stock Exchange practice is in each case to relate the dividend to the *whole* of price, whereas equation (2) shows the price as made up of two parts: one "paying for" the dividend and a second "paying for" the undistributed profits. In the typical case where undistributed profits are positive, α_1 will be less than what the Stock Exchange would call the number of years' purchase.

For some purposes it is convenient to rearrange equation (2) to conform to traditional terminology. This can be done by rearranging (2) so that the coefficient of dividends will be more like the traditional number of years' purchase, and indeed will be equal to its value in the average case. For this purpose we introduce a new parameter, λ, to stand for the average amount of cover for dividends in the industry, *i.e.*,

$$\lambda = \frac{1}{n}\Sigma\frac{u}{d}$$

then (2) may be rewritten as

$$p = (\alpha_1 + \lambda\alpha_2)d + \alpha_2(u - \lambda d) + v$$

or

$$p = \alpha_1^* d + \alpha_2 u' + v$$

The new variable u' may be regarded as "excess" undistributed profits over the normal for a company paying that dividend, and its coefficient remains the same as the former coefficient of u. But the coefficient of d is increased, to allow for the fact that u' is smaller than u; it may be regarded as the capitalisation coefficient of dividends given "normal" undistributed profits. Since, by least squares on (4)

$$a_1 = \text{Mean}\left(\frac{p}{d}\right) - a_2\,\text{Mean}\left(\frac{u}{d}\right)$$

the computed value of α_1^*, or a_1^*, is equal to the number of years' purchase of dividends in the traditional sense, averaged over the sample. Values of a_1^* have been computed for breweries, and the electrical and woollen samples for the period 1954–57, and the results together with corresponding values of λ are given in Table V.

An example will illustrate the meaning of this new group of estimates.

Table I for 1955 happens to show investors as valuing both brewery and electrical shares on the basis of about 13·5 years' purchase of dividends plus about 4·5 years' purchase of undistributed profits. However, the number of years' purchase of dividends, given normal undistributed profits—*i.e.*, the average of what the Stock Exchange would call the number of years' purchase—is quite different in the two cases; Table V shows that for breweries it is about 17 years and for electrical companies about 23 years. But

TABLE V

Values for the Brewing, Electrical and Woollen Samples, 1954–57

Year.	"Number of years purchase" of dividends. a_1^*.			Average amount of cover for dividends, λ.		
	Brewing.	Electrical.	Wool.	Brewing.	Electrical.	Wool.
1954	16·23	22·39	10·65	0·97	1·89	1·24
1955	17·22	22·99	9·52	0·91	1·97	1·07
1956	12·85	17·85	10·39	1·05	2·02	1·28
1957	13·19	19·61	12·44	0·94	1·83	1·54

Note: As a_1^* is computed from a_1 and a_2, it is subject to the errors in them.

Table V also shows that what is assumed here to be "normal" undistributed profits is, in the case of breweries, about equal to what is distributed and, for electrical goods, about twice what is distributed.

V. GROWTH AND SIZE

It is clear from Tables I and IV that, in some cases, the model does not fit the data at all precisely. The object of this section is to discuss two attempts made to improve the model.

The changes that might be expected to improve the model depend on the underlying causes of the poor fit. If the model is not realistic to begin with, then any attempt made to adapt equation (2) is unlikely to meet with success. However, in a high proportion of cases it appears that both dividends and undistributed profits have significant effects on prices. There are thus two possibilities: either the assumptions as to homogeneity are not realistic, in which case some attempt must be made to take account of this, or the variables used so far are not sufficiently reliable indicators of the market's view of expectations, and this deficiency must be allowed for.

A particular indicator of expectations might be the past rate of increase in dividends. An attempt was made to improve the fit by assuming that instead of capitalising the latest dividend as it stands, we should first add on a fraction of it (g) which depends on the rate of growth of dividends in the past. The results exhibit no striking increase in correlation, and it does not appear that the past rate of increase in dividends per share is a very important

variable in the explanation of share prices.[1] This tentative conclusion, however, is based on limited information.[2]

In a recent paper Morgan and Taylor have demonstrated that significant correlation exists between the yields of shares and the logarithms of the sizes of corresponding companies. A number of reasons were suggested in that article why company size should influence share prices, and no detailed justification need be given here.

The model used was

$$p = \alpha'_1 d(1 + \alpha_3 \log K) + \alpha'_2 u + v_1 \tag{5}$$

which transformed as before becomes

$$\frac{p}{d} = \alpha'_1 + \beta_1 \log K + \alpha'_2 \frac{u}{d} + \epsilon_1 \tag{6}$$

where $\beta_1 = \alpha_3 . \alpha'_1$ and K = net tangible assets of the company in question, as given on the Moody's cards.

The logarithms of sizes were used, since it was felt that marginal increments in size would have a diminishing effect on prices. A difference in sizes between two companies of, say, £100,000 would have greater effect on prices if the sizes of the firms were in the neighbourhood of £0·5 million than if they were in the region of £40 million.

The variable K is measured in units of £1 million, so that the parameter α'_1 may be thought of as the capitalisation factor which is applied to dividends when a company has net tangible assets of £1 million. If assets are of some other size an adjustment factor is needed which is obtained by adding a proportion $2{\cdot}303\alpha_3$ for each time that the assets are multiplied tenfold, and subtracting a proportion $2{\cdot}303\alpha_3$ for every time they are divided by ten.[3]

The estimates are given in Table VI. The most notable improvement in fit is for the sample of stores. For every year examined, correlations and the statistics S are considerably improved, and all of the explanatory variables have a significant effect on price. To a lesser extent, this is also true of wool, except in 1949 and 1953, when the influence of retentions is highly unreliable and could well be zero. For the electrical sample in 1949 the effect of undistributed profits is also insignificant. Thus for these samples

[1] A similar result was obtained by Durand. See D. Durand, *Bank Stock Prices and the Bank Capital Problem*, and "Bank Stocks and the Analysis of Covariance," *Econometrica*, Vol. 23, 1955, pp. 30–45.

[2] It could be in (5) that g and u/d are intercorrelated. Companies with high cover could, on average, be those firms with a rapid past increase in dividends. The analysis then sugegsts that u/d is a more reliable variable in the explanation of p/d than the past rate of growth g, and that consequently g is superfluous to the explanation.

[3] The reason for the 2·303 is that in the computations *natural* logarithms were used, and 2·303 = $\log_e 10$. The reason for using natural logs was purely practical; the calculations were performed on EDSAC II, the high-speed computer at the Mathematical Laboratory, University of Cambridge, which, as part of the programme, transformed the observed values of net tangible assets, the measure of size, into *natural* logarithms.

TABLE VI

Estimates for Equation (5) *for all Samples*, 1949, 1953, 1954, 1955 *and* 1957

Sample	Year.	a_1'.	a_2'.	a_3.	R^2.	$S\%$.
Brewing	1949	17·21 (±0·84)	1·35 (±0·17)	0·051 (±0·014)	0·467	5·99
	1953	12·68 (±1·13)	2·00 (±0·25)	0·059 (±0·020)	0·364	8·74
	1954	13·03 (±0·04)	3·34 (±0·31)	−0·002 (±0·018)	0·554	9·14
	1955	13·15 (±1·50)	4·23 (±0·35)	0·011 (±0·017)	0·430	12·37
	1957	11·38 (±0·77)	1·74 (±0·38)	0·010 (±0·019)	0·306	7·90
Electrical	1949	17·98 (±1·04)	−0·33 (±0·29)	0·155 (±0·036)	0·434	19·42
	1953	12·98 (±0·66)	1·25 (±0·22)	0·076 (±0·029)	0·670	11·39
	1954	15·78 (±1·28)	2·64 (±0·55)	0·090 (±0·041)	0·566	13·11
	1955	13·48 (±0·92)	4·61 (±0·39)	0·025 (±0·047)	0·847	7·78
	1957	9·45 (±1·24)	4·72 (±0·50)	0·129 (±0·069)	0·814	16·03
Stores	1949	12·09 (±1·08)	1·62 (±0·27)	0·144 (±0·019)	0·421	21·63
	1953	14·05 (±0·88)	0·61 (±0·20)	0·122 (±0·014)	0·334	20·88
	1954	14·75 (±0·96)	1·94 (±0·21)	0·214 (±0·017)	0·646	16·01
	1955	12·46 (±1·13)	3·50 (±1·04)	0·258 (±0·049)	0·713	15·30
	1957	13·62 (±1·51)	2·01 (±0·30)	0·233 (±0·042)	0·540	19·04
Wool	1949	15·95 (±1·35)	0·21 (±0·33)	0·140 (±0·047)	0·265	20·21
	1953	13·18 (±0·66)	−0·22 (±0·24)	0·091 (±0·052)	0·122	22·63
	1954	11·09 (±1·34)	1·08 (±0·69)	0·173 (±0·075)	0·294	20·28
	1955	8·70 (±0·63)	1·41 (±0·40)	0·122 (±0·047)	0·584	12·39
	1957	8·76 (±0·56)	1·54 (±0·34)	0·158 (±0·047)	0·657	14·53
Large companies	1949	16·93 (±1·27)	0·73 (±0·32)	0·001 (±0·032)	0·105	20·20
	1953	15·51 (±1·88)	2·23 (±0·45)	−0·072 (±0·271)	0·365	22·11
	1954	16·25 (±2·24)	3·58 (±0·88)	−0·008 (±0·052)	0·276	24·31
	1955	13·49 (±3·04)	3·62 (±1·22)	0·071 (±0·063)	0·183	28·88
	1957	14·69 (±2·28)	1·00 (±0·79)	0·046 (±0·049)	0·057	32·21

Note: a_1' and a_2' are the modified capitalisation coefficients for dividends and undistributed profits when the size of the firm is taken into account; a_3 is the coefficient attached to the measure of size, and is explained in the text; R is the multiple correlation coefficient between p/d, u/d and $\log K$; S is again the average percentage error involved in estimating prices from this equation.

and years (electrical 1949; wool 1949 and 1953) prices may be assumed to depend on dividends and company size alone, and equation (6) then reduces to the function implied by the analysis of Morgan and Taylor.[1]

For the brewing and electrical samples, the improvement in the explanation of prices (S) and $p/d(R^2)$ is not generally as marked as in the samples of stores and woollen companies. This is more obviously true for the sample of large companies and the explanation of prices is, on average in this case, much less accurate than for any of the four industrial samples.

[1] E. V. Morgan and Cynthia Taylor, *op. cit.* Neglecting a residual term, their function would have been

$$\frac{d}{p} = \phi_1 + \phi_2 \log K; \ \phi_2 < 0$$

This may be rewritten as follows:

$$p = \frac{1}{\phi_1} d \left(1 + \frac{\phi_2}{\phi_1} \log K\right)^{-1}$$

$$\doteq \frac{1}{\phi_1} d \left(1 - \frac{\phi_2}{\phi_1} \log K\right)$$

and since ϕ_2 is negative, this final equation is similar to (5), given that α'_2 is approximately 0.

The contribution of the variable K to the explanation of p/d is more clearly seen in Figs. 2 and 3, and Table VII. The uppermost section of Fig. 2 is exactly similar to Fig. 1, but applies to the woollen sample in 1957: the observed and calculated values of p/d are given, based on undistributed profits without reference to capital (*i.e.*, on equation (4)), and corresponding discrepancies are shown directly below. The remaining sections refer to the observed and calculated values of p/d, based on equation (6), *i.e.*, allowing also for size, the corresponding discrepancies and the contributions to the variables u/d and K to the analysis; reference to the bottom section indicates that the companies have been arranged in ascending order of K. A similar picture is given in Fig. 3, which refers to the sample of stores in 1957, save that some of the sections have been combined. The points which are not joined together refer to equation (4), so that the reader can see more directly the differences between the explanation which excludes size and that in which it has been included.

An example may help to show what the diagrams and analysis reveal, as well as the limitations which still remain. The largest company in the stores sample is Marks and Spencer, which therefore appears at the right-hand end in Fig. 3. This company's shares are priced very highly in relation to the dividend paid, so that the " actual " value of p/d is far above the mean for the sample. The first equation attempted to " explain " this in terms of undistributed profits, and failed badly, since the ratio of undistributed to distributed profits was about average: the unconnected dot in the top section of Fig. 3 is far below the actual value of p/d. The second equation introduced an allowance for the large assets which Marks and Spencer own, and the dotted line shows that this reduced the discrepancy by about half. But the explanation remains poor—indeed the worst for the sample; this is because the high price of the shares is partly due to other factors—such as the company's reputation for good and progressive management, shown (*inter alia*) in the high profits which it earns on both old and new assets—and these have not been brought into the analysis. (Indirectly they have probably had some influence, since the reason why the equation attaches so much importance to size is probably the fact that distributors which are efficient tend to grow large; but this is not sufficient to give a good explanation.)

In the woollen sample it can be seen from the bottom section of Fig. 2 that the difference in contribution of size to the explanation of p/d between the smallest and largest firm is roughly 5 years' purchase (from about $-2{\cdot}5$ to $+2{\cdot}5$) whereas for stores this difference is about 17 (from about -5 to $+12$). These are sizeable differences, especially when related to the scale of p/d.

The differences in effect of size on the *price* between the smallest and largest companies are given in Table VII. Since all of the explanatory variables vary from company to company, it is necessary, in order to examine

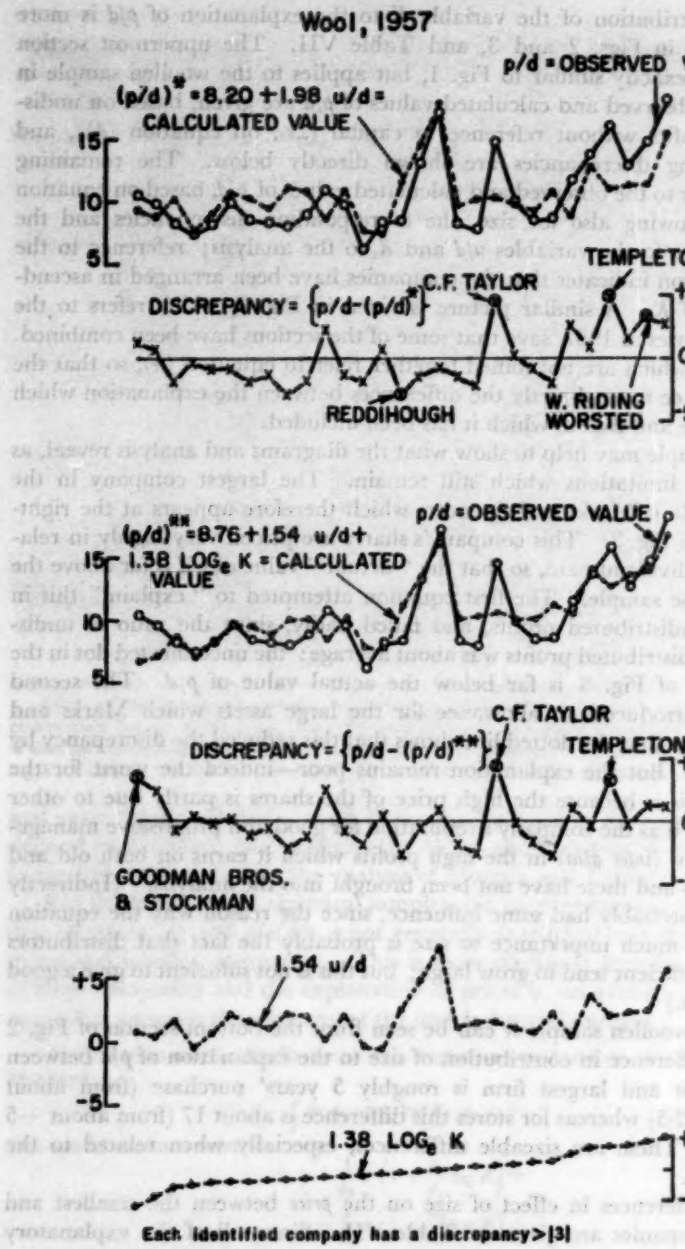
Wool, 1957
p/d = OBSERVED VALUE
(p/d)* = 8.20 + 1.98 u/d = CALCULATED VALUE
15
10
5
TEMPLETON
C.F. TAYLOR
DISCREPANCY = {p/d - (p/d)*}
+5
0
-5
REDDIHOUGH
W. RIDING WORSTED
p/d = OBSERVED VALUE
(p/d)** = 8.76 + 1.54 u/d + 1.38 LOG$_e$ K = CALCULATED VALUE
C.F. TAYLOR
DISCREPANCY = {p/d - (p/d)**}
TEMPLETON
GOODMAN BROS. & STOCKMAN
1.54 u/d
+5
0
-5
1.38 LOG$_e$ K
+2.5
0
-2.5
Each identified company has a discrepancy > |3|

FIG. 2

the effect of size alone, to assume a representative value for dividends and undistributed profits, or their ratio, and then compute prices for the extreme sizes. In Table VII the ratio of u/d has been set at its sample mean in each case and, following earlier notation, this parameter is given by λ. Thus

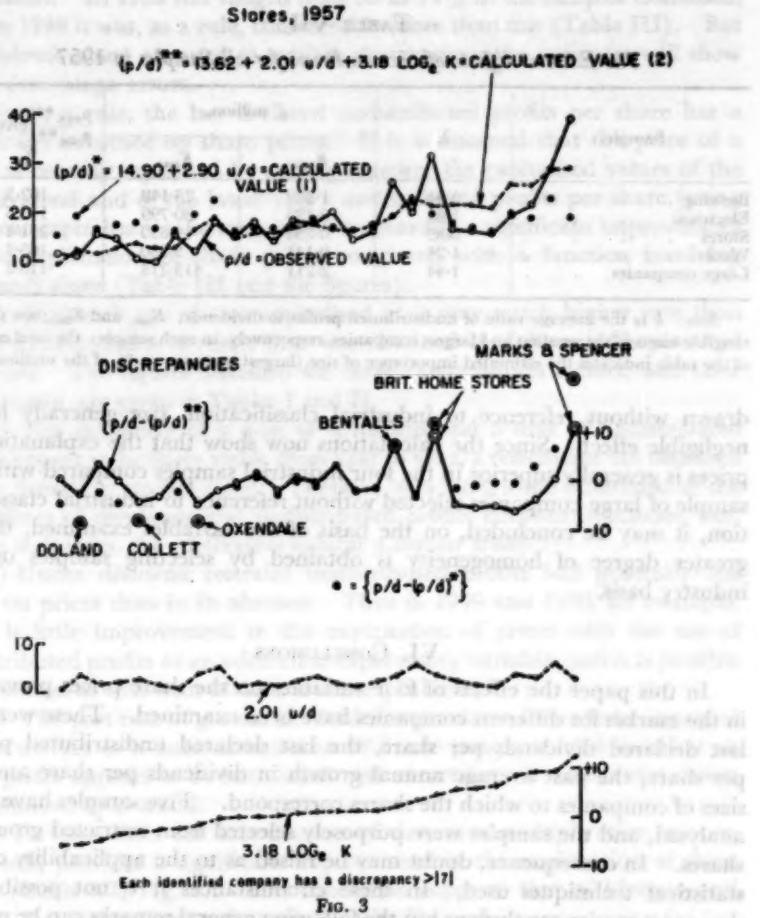

FIG. 3

the ratios of the calculated price based on the size of the largest company to that based on the smallest do not represent the *actual* percentage by which prices of specific shares are raised. They show that the price of the largest *typically might* be raised by the amount shown above that of the smallest. Thus for breweries, assuming the postulated value of λ for both the smallest and largest companies, size can hardly affect the price, whereas for the sample of stores the price can be raised by as much as 150%.

It may be concluded, therefore, that size has a significant part to play in the explanation of share prices, so long as samples of shares classified by industry are considered. Furthermore, it appears from the estimates that the influence of size is fairly stable over time. In the case of the sample

TABLE VII

The Extreme Effects of Size on Prices for all Samples in 1957

Sample.	λ.	£ million.		$\frac{p_{max.}^{**}}{p_{min.}^{**}}$ given λ, %
		$K_{min.}$	$K_{max.}$	
Brewing	0·94	1·380	25·148	102·5
Electrical	1·83	0·239	80·799	143·5
Stores	0·89	0·258	49·630	251·1
Wool	1·24	0·141	5·930	165·1
Large companies	1·44	2·211	413·218	115·2

Note: λ is the average ratio of undistributed profits to dividends; $K_{min.}$ and $K_{max.}$ are the net tangible assets of the smallest and largest companies, respectively, in each sample; the final column of the table indicates the estimated importance of size (largest company as % of the smallest).

drawn without reference to industrial classification, size generally has a negligible effect. Since the calculations now show that the explanation of prices is generally superior in the four industrial samples compared with the sample of large companies selected without reference to industrial classification, it may be concluded, on the basis of the variables examined, that a greater degree of homogeneity is obtained by selecting samples on an industry basis.

VI. CONCLUSIONS

In this paper the effects of four variables on the share prices prevailing in the market for different companies have been examined. These were the last declared dividends per share, the last declared undistributed profits per share, the past average annual growth in dividends per share and the sizes of companies to which the shares correspond. Five samples have been analysed, and the samples were purposely selected from restricted groups of shares. In consequence, doubt may be raised as to the applicability of the statistical techniques used. In these circumstances it is not possible to draw any precise conclusions but the following general remarks can be made.

(1) Two methods of sample selection have been used in this analysis. One selected firms on an industry basis first and then eliminated firms for which there was not an active market. The other considered only the most active shares irrespective of industry. It appears that a greater degree of homogeneity is obtained in the former case, and consequently this method of selection is to be preferred. This conclusion corroborates the view of Johnson, Shapiro and O'Meara, who, on obtaining low correlations with

samples similar to the sample of large companies of this study, suggested that an industry classification might improve matters.[1]

(2) Variations in the last declared dividend per share explain a considerable proportion of the variation in corresponding share prices between companies. In 1955 this ranged from 59 to 74% in the samples examined, and in 1949 it was, as a rule, considerably more than this (Table III). But if dividends alone are used to explain share prices, the estimates will show large percentage errors.

(3) As a rule, the last declared undistributed profits per share has a significant influence on share prices. If it is assumed that the price of a share is broadly explained by adding together the capitalised values of the last dividend and of the latest year's undistributed profits per share (using different capitalisation factors), there is generally a significant improvement in the explanation of share prices compared with a function involving dividends alone (Table III and the figures).

(4) Dividends are always capitalised at a very much higher rate than undistributed profits, a result that was obtained by Johnson, Shapiro and O'Meara. The figures obtained for these capitalisation factors, and their relationship, are given in Tables I and II.

(5) The influences of a unit of dividends and a unit of undistributed profits appear to be fairly stable from year to year, a conclusion not obtained in the American studies cited. There is, as a rule, some difference in the coefficients of dividends and undistributed profits between industries, but, within industries, the coefficients exhibit a similar trend.

(6) Under dividend restraint undistributed profits had generally less effect on prices than in its absence. Thus in 1949 and 1950, for example, there is little improvement in the explanation of prices with the use of undistributed profits as an additional explanatory variable, and it is possible to do almost as well with dividends alone (Table I).

(7) The past rate of growth in dividends per share seems to be regarded by the market as a dubious indicator of fu re prospects, and its effect on share prices appears to be both small and uncertain. A similar conclusion was obtained by Durand.

(8) In most cases the introduction of size, as a multiplicative term to dividends, provides a significant improvement in the explanation of share prices (Table VI, Fig. 3). This conclusion supports that of Morgan and Taylor, but is contrary to that obtained by Durand.

(9) The influence of a unit of size appears to be reasonably stable over time.

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[1] *Op. cit.*, p. 186.

REVIEWS

Gold and the Dollar Crisis. The Future of Convertibility. By R. TRIFFIN. (New Haven, Connecticut: Yale University Press (London: Oxford University Press), 1960. Pp. xiii + 195. 38*s*.)

IN this book Professor Triffin develops his case for the conversion of the International Monetary Fund into a fully-fledged international bank, deposits with which would be regarded by central banks as entirely equivalent to gold. He makes a strong case for some means of expanding the monetary reserves of central banks faster than is possible out of the fraction of the output of new gold which is available for monetary purposes. For a very long time the monetary gold stock of the world has been rising much more slowly than the volume of international trade. Various expedients have been used to fill the gap—the replacement of gold coins in circulation with notes and bank deposits, devaluations of currencies and, especially in recent years, the use as international reserves of short-term claims on other countries, mainly the United Kingdom and the United States. The very growth of these claims, however, sooner or later tends to weaken the liquidity position of the countries whose debts they are, and, as in 1931, may lead to a crisis which reduces or destroys their value as international reserves. Alternatively, and perhaps more probably, the countries of deposit may have recourse to trade and other restrictions in the effort to protect their positions. The recent uncertainty about the future of the dollar, however unjustified, gives point to the argument.

Before advancing his own proposals, Professor Triffin examines and rejects two suggested remedies which he regards as false solutions—a rise in the price of gold and a system of fluctuating exchange rates. His own proposals are these. First, the present net claims of members of the I.M.F. should be converted into deposits, to be included in their reserves as equivalent to gold. Second, and in addition, one-fifth of all members' existing holdings of gold and foreign exchange should be transferred to the Fund, in exchange for deposits. Third, all other reserves of foreign exchange held by central banks, except for working balances, should subsequently be transferred to the Fund. Fourth, the Fund should be allowed to increase the total of its deposits by making loans to members, mainly underdeveloped countries. In order to avoid the possibility of creating a world-wide inflation, the annual increase in deposits would be limited to a fixed proportion, such as 3% or 5%. Finally, in taking over existing foreign-exchange reserves, the Fund would come into possession of a mixed bag of dollar and sterling bank deposits, Treasury and other bills, securities and other claims.

These should be gradually paid off, and the proceeds re-invested by the Fund, mainly in loans to underdeveloped countries.

Professor Triffin does not advance any detailed argument in support of his proposal for converting the whole of existing foreign-exchange reserves into I.M.F. deposits, but merely refers to an earlier chapter in which he attacks the whole system of holding central bank reserves in the form of claims on other countries. Apart from the dangers to the liquidity of the countries of deposit arising from too large an increase in foreign-owned balances, which would presumably be removed if the Fund's deposits were regarded as equivalent to gold and could be increased to any extent needed, he seems to dislike foreign-exchange reserves on two grounds, one that the use of national currencies as international reserves is "irrational," and the other that the building-up of foreign-exchange reserves involves the making of loans from depositor countries, frequently poor, to banker countries, usually rich.

Neither of these last two grounds for dislike seems very convincing. The use of a national money as an international reserve seems to be no more irrational than the traditional development of internal banking systems, involving the use of debts of private businesses as if they were national money. The two developments seem to be strictly analogous. As to the other objection, it is valid only if the country of deposit uses the short-term loans so obtained to finance its own adverse balance of payments on current account. If, however, it is thereby enabled to provide more capital for other countries, it is fulfilling a strictly banking function; the depositor countries are financing, not the banker country, but each other, or possibly themselves. Even in the United Kingdom, where since 1947 a rise of £400 million in the balances of sterling-area countries has been accompanied by an almost equal fall in the balances of non-sterling countries, it is not necessarily true that the United Kingdom has used loans from the sterling area to pay off its other debts. An equally valid interpretation is that the United Kingdom has used part of its own aggregate favourable balance of payments of £1,000 million to repay debts to non-sterling countries, while the rise in sterling-area deposits has enabled it to lend £1,000 million abroad instead of £600 million.

Another omission from Professor Triffin's discussion is any mention of the probable effects of his proposals on existing international financial connections. It is true that he devotes two chapters to discussing the changes needed in the European Monetary Agreement and the financial arrangements of the European Economic Community; but there is no discussion of their implications for the sterling area, which, indeed, is hardly mentioned. Many British readers, therefore, even if they sympathise with his general diagnosis, will have difficulty in accepting, on the evidence provided, the precise proposals made in this book. There is, however, a possible variant to Professor Triffin's proposals which is suggested in a reply made by

Professor Triffin himself to a question addressed to him in the course of his evidence before the Joint Economic Committee of Congress, quoted in full. The question was how the banks in the United States managed with a cash ratio far below the minimum ratio of gold reserves to foreign balances regarded as safe for the United States; and his reply was that there was nothing in the international monetary system corresponding to the Federal Reserve System, which exists partly to assist member banks in the event of a run on them (p. 169).

It would seem worth while to explore the possibility of remedying this deficiency in the international monetary system by converting the International Monetary Fund, not, as Professor Triffin proposes, into a bank for central banks, but into a central bank for central banks. Such an institution would not replace the existing system of foreign-exchange reserves, but reinforce and supplement it. It would accept deposits, not in the form of claims on other currencies, but only in the form of gold or of claims upon itself. It would have two main functions: to act as a lender of last resort to countries of deposit which were faced with heavy withdrawals of foreign balances; and to expand the total of its deposits in line with the world's expanding need for international reserves by making other loans, perhaps through the medium of the International Bank or even to the United Nations itself. With such a reinforcement, the present structure of international financial relations would be able not only to continue to exist but also to grow and develop, without incurring the dangers which Professor Triffin sees as inherent in the present system.

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The Theory of the Growth of the Firm. By E. T. Penrose. (Oxford: Blackwell, 1959. Pp. viii + 272. 35*s.*)

Whatever the reality of a "managerial revolution" in twentieth-century capitalism, the idea has certainly been slow to influence twentieth-century economic theory. Berle and Means' *The Modern Corporation and Private Property* was published in 1936, and Professor Gordon's *Business Leadership in the Large Corporation* in 1945, yet, as a study of the many subsequent text-books would show, although theorists received these and other "institutional" studies with nodding heads, the game continued almost unchanged. We all agreed that static profit maximisation represented a gross simplification of business behaviour, but tacitly assumed that more complex, less "economic", motivation would be incapable of formal analysis: if the gates were opened, description would largely replace analysis, and a delightful intellectual discipline be lost, possibly for ever. What would be left to teach?

An interlude at Oxford, inspired by Mr. P. W. S. Andrews' *Manufacturing*

Business, though helpful to the morale of undergraduates contemplating careers in business, was altogether too subjective for genuinely theoretical treatment: Mr. Andrews' entrepreneurs played the *Wealth of Nations* in modern dress; "managerial" capitalists had no explicit role. More recently, Mr. Peter Wiles, also at Oxford, advanced matters considerably (in *Price, Cost and Output*) with a well-worked-out argument that *several* theories were required according to environment. Mr. Wiles' treatment, however, although explicitly recognising the managerial revolution—"quite fatal to profit maximisation"—did not deal with investment and growth. A dynamic theory was still lacking.

But since 1959 things have been changing. Three books, the one reviewed here, J. Downie's *The Competitive Process* and W. J. Baumol's *Business Behaviour, Value and Growth*, show considerable promise for a dynamic and genuinely analytical development of the field. We seem to be moving towards a general body of micro-theory based on overt assumptions of managerial motivation, in particular on the assumption that men who control productive assets which they do not own are likely to find a personal satisfaction in causing the assets to grow. True, we shall be analysing a brand of capitalism which may already be passing, but this is better than remaining tied to a brand which began to be replaced half a century ago.

Major theoretical developments require more than the creation of new models from old blocks, they require a new set of blocks altogether; new concepts, new definitions, new ways of looking at old institutions, often a whole new frame of reference. When the anatomy of a subject has been thus redefined, *then* its mechanics may be analysed. In earlier days these two phases were usually combined, not only in the classics but also in the post-Marshallians and in Keynes. In the future, as problems are studied at an increasing level of complexity, greater division of labour may be necessary. Mrs. Edith Penrose has provided an excellent example of the possibilities.

For this book—which, if the evidence of last-years students' essays is any guide, is likely to prove one of the most influential of the decade—does not purport to provide an integrated analytical model of the growth of the firm. Rather it describes the why and the way, the controlling boundaries of a historical process. It is far more than an institutional description; new concepts are introduced and defined, and to some extent interactions analysed: we could say that the author is concerned with the theoretical internal biology of growth, but not, at this stage, with the logical interdependence of the whole picture which emerges. The book is indeed so packed with ideas, that it would be impossible for all of them to be consistent.

A firm is conceived as an administrative organisation, a pool of productive resources in an administrative framework—an expanding "gang" of managers associated with capital assets, production workers and a fund of accumulated commercial and technical experience. Since the experience is

constantly accumulating, the productivity of this pool of resources is always changing, without necessarily requiring injections of new knowledge from outside. A firm may produce any product which its experience permits and is distinguished from other units in the economy by its administrative character—

> "The essential difference between economic activity inside the firm and economic activity in the 'market' is that the former is carried on within an administrative organisation, while the latter is not" (p. 15).

The central management (controlling in-group) of many, though not all, firms desires the growth of the empire they control, for there lies the way to prestige, satisfaction, better salary and a wider scope for personal ambitions and abilities. Shareholders function as no more than a restraint on these ambitions.

Many firms have grown continuously over long periods of time. The absolute size attained by a firm at any one moment is but a by-product of the process of growth, of an internal process—that is—leading to cumulative movements. Orthodox theory, being static, neglects the possible advantages of *movement* from one position to another, and concentrates exclusively on *being* in one position rather than another.

Maximisation of growth, it is argued, is equivalent to maximisation of the rate of increase of the absolute size of the annual gross profits.

> "Total profits will increase with every increase of investment that yields a positive return, regardless of what happens to the marginal *rate* of return on investment . . . growth and profits become equivalent as the criteria for the selection of investment programmes . . . to increase the total long run profits of the enterprise . . . is equivalent to increasing the long run rate of growth" (p. 29).

Growth is achieved by diversification, by acquisition of other enterprises and by merger. The rate of growth is limited by finance, by administrative factors and by markets. If one of the limits gets out of line with the others, the policy variables, such as diversification, may be employed for adjustment:

> "It seems likely that few individual markets can grow as fast as many firms in the middle-size range can grow. It is therefore to be expected that 'diversification' will become the slogan of firms that are reasonably well-established, possess efficient managerial resources . . . [etc.]. Existing markets may be profitable and growing, but all that is required to induce diversification is that they do not grow fast enough" (p. 145).

The foregoing represents a gross summarisation of the main thesis. Mrs. Penrose is not easy to summarise, and we almost certainly fail to do her justice. Particularly deserving of expanded commentary are her sections on the administrative limits on the rate of growth, and on mergers. For, by

acquiring another " going " administrative organisation a firm may be able to break through the internal barrier to rapid organisational development.

Mrs. Penrose emphasises that the administrative structure of a firm is the creation of the men who run it; these men alone can organise expansion. The efficient planning of expansion can be undertaken only by the *existing* team of managers who have accumulated experience in working together. Because, in relation to any one firm, this experience is a unique commodity, no outsider, however well qualified, can be instantaneously imported at full efficiency: he will become useful, in the special sense of being able to contribute effectively to the planning of expansion, only after he has belonged to the organisation for a finite period of time. Furthermore, the requisite experience in collaboration has to be obtained " on the job "; therefore the absorptive capacity of the existing team, at any one moment, is limited. It follows that the rate of efficient managerial expansion is also limited.

On mergers, Mrs. Penrose provides a fairly comprehensive discussion of the basic reasons for mergers, in terms of her own theory—of the reasons why, that is, the value of the merged organisations is greater than the sum of the values of the parts. A firm may buy another to obtain a going concern, to eliminate a competitor, to facilitate diversification or very often for all three reasons combined. A firm may sell itself to another for a variety of reasons, by no means all implying defeat or failure. Few studies have apparently been made of mergers from the point of view of the firm acquired, but business biographies suggest that a small, growing firm frequently reaches a critical size at which further rapid growth becomes impossible without association with an already established larger corporation. The short point for economic theory is that merger is very much more than a stage in deliberate monopolistic concentration.

One should not complain that Mrs. Penrose's collection of propositions is not fully integrated; had they been so, many suggestive ideas would have almost certainly been suppressed. However, certain analytical criticisms are worth making, if only to indicate lines of development.

Mrs. Penrose is definitely " woolly " on the relation between profits and growth. In the passages referred to above she seems to be implying that investment will always be undertaken if the marginal rate of return is positive, or (this is not clear) above some minimum. However, there is a growing consensus of belief in a definite relationship (through interaction between stock market, dividend policy and reinvestment rate) between the maximum obtainable growth rate of the supply of capital to a corporation and the rate of profit earned on the existing assets. If so, a variation in the rate of profit currently earned on existing total capital may react on the long-run growth of total profits (and capital) over time. And if, in addition, the growth rate of demand is related to prices charged, and production efficiency to the rate of diversification and associated administrative growth, the rate of profit on existing capital may well be involved in both the " supply "

and the " demand " sides of the equation, suggesting the possibility of determinate maximum solutions. These are questions to be investigated.

The role of profit gets Mrs. Penrose into specific difficulties when applied to the theory of merger. Merger is seen to occur as a result of a relation between the values of two firms and their potential joint value when merged. The value of a firm is assumed to be directly related to existing and potential profits, but we are not told how a stream of profits is capitalised. Surely there can be no place in Mrs. Penrose's system for a " normal " rate of profit? A theory of merger properly consistent would compare the *growth* potential of the merger with the growth potentials of the existing organisations, and for the reasons already mentioned, growth potential cannot be estimated from potential aggregate profits alone.

Another place where a more " theoretical " treatment would have been valuable is in the analysis of the administrative limits. On examination, this proposition depends on a theory of saturation: the length of time required for a new recruit to the central team to become " efficient " must be a function of the ratio of recruits " under training " to already-efficient members; (if not, the long-run growth rate is not limited). Mrs. Penrose gives good reasons for believing in the existence of such a relationship, but does not investigate the form of the function. However, only a certain class of functions limit the growth rate; with other forms, every addition to the rate of recruitment does yield some increase in the rate of growth of the efficient team.

Finally, a point everybody working in this field will have to consider carefully: it is not logical to assume that a desire for size is necessarily equivalent to a desire for growth. Is the manager's prestige associated with the absolute size of his empire, or of its rate of change? The answer, almost certainly, is " both." A man who becomes Chairman of I.C.I. will have largely satisfied his ambition, and will not be expected to make a corporation of this size grow much further. But in order to become Chairman of I.C.I. it is helpful to have previously demonstrated one's ability by leading the growth of a smaller corporation. Also, status-satisfaction is relative, and relative managerial status must depend on relative corporation size. Something of a " rat race " is therefore inevitable. A management content to stand still will experience declining relative status. Thus, provided we accept that some firms' managements may possess different subjective propensities to grow from others, the growth-rate-maximisation hypothesis is probably a good one, but we should also investigate the effect of conflicting motives, such as a desire for security through financial stability, expressed perhaps in a tendency to accumulate liquid reserves.

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Public Finance in Theory and Practice. By A. R. PREST. (London: Weidenfeld & Nicholson, 1960. Pp. 408. 45*s*.)

DR. PREST's new book is an obviously essential item for second- or third-year undergraduate reading lists, and much of it is of interest to a wider circle of readers. Although there is free entry into the field, Dr. Prest has a monopoly, there being no other post-war British works of similar scope. Since his book costs 45*s*., however, some competition may be expected, but rivals will not find it easy to produce a better product.

The book is divided into three parts. The first is on theory, and superficially seems to be the most original, since the different chapters deal with different aspects of public finance problems and not with one tax at a time. Thus there are chapters on resource allocation, incentive, income determination, equity and administrative efficiency. Yet despite this ingenious layout, the contents are fairly orthodox, and the reader is taken through the familiar topics of excess burden, taxation and risk-taking, the scope for government expenditure, taxation and the supply of effort and so on. The analysis is fairly elementary, but Dr. Prest is always aware of the subtleties, even where he barely mentions them. An attractive feature is his dislike of some of the imprecise orthodox terminology such as " incidence."

The second part of the book describes the British system of public finance: national and local. Just as Part I might be followed by Musgrave's treatise, so might this part serve as an introduction to Brittain's work, though the emphasis is more economic and less constitutional than the latter. It is difficult to make this sort of description interesting, but at least it is just what students need to know.

The third part of the book deals with some major problems of policy. The topics discussed are: personal income taxation, capital gains taxation, company taxation, the taxation of overseas profits, the structure of indirect taxation and problems of local finance. The discussion is much like the report of a Royal Commission, only better. In fact, this part of the book deserves to be read by everyone interested in economic policy, for it contains a set of largely self-contained essays in applied economics which are of high quality.

Every teacher of public finance may be expected to have his own grouses about this book, if only because exposition is partly a matter of taste. One point where I would find myself criticising the book rather than explaining it is the concept of an " equal-yield distributionally neutral tax," which is used in the chapter on equity. Dr. Prest argues that we need this in order to examine the distributional effects of various taxes which we can (conceptually) substitute for it. Otherwise, he says, we are left with the " even less satisfactory " approach of seeing what happens when a tax is raised and debt repaid, expenditure increased or another tax cut. Now this implies that Dr. Prest chooses to examine the distributional effects of doing what no

mortal government can ever do while refusing to display any interest in the distributional effects of those combinations of measures which alone are possible. This seems a waste of effort.

One feature of the book which deserves criticism is that the theory expounded in the first part receives practically no application in the third part. This does not reflect on Dr. Prest alone, however, for the same is true of other writers in the field. But it shows up particularly strongly in *Public Finance in Theory and Practice*, partly because of the title and partly just because it is well written. The great bulk of the third part contains examinations of what is fair and what is practicable, but there are very few paragraphs which actually use any bits of analysis from Part I.

Why is this? The answer is, I suspect, that the theory is not used simply because it is useless. There are very few definite propositions: an income tax may raise or lower the supply of effort, the substitution of death duties for a tax on investment income may raise or lower saving, replacing a direct by an indirect tax may or may not improve resource allocation—and so on and so forth. The sad fact is that income effects and second-bestness have turned certainty into doubt. Thus, even the most hallowed proposition of public finance " Taxing things discourages them " is not always true, and the case for teaching students all this stuff seems rather weak. But, to return to Dr. Prest in particular, they would be very foolish not to read the last two-thirds of the book, and the first third will at least help them in examinations.

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The World of Adam Smith. By C. R. FAY. (Cambridge: Heffer, 1960. Pp. vii + 97. 15*s*.)

Intelligence and Democratic Action. By F. H. KNIGHT. (Cambridge, Mass.: Harvard University Press (London: Oxford University Press), 1960. Pp. vi + 177. 30*s*.)

WHILE the liberal tradition lives vigorously among scholars, it is neither surprising nor depressing that its richest spokesmen are veterans. For they know most about it. Of them, few remain more lusty than Dr. Fay. His inspiration in this book is " the Master," but the analogies he constantly draws keep us up to date as lung cancer (tocacco) and the dilution of whisky. This indeed is a delicate study in the art of historical analogy. In his own fine words, " The lure of history is the way it runs into the present."

The basis of the analogy is usually a text from Adam Smith. The first is with another giant of his age: it is good to have " *Edmund Burke and Adam Smith* " thus available. Both saw far ahead. On the colonial issue Dr. Fay rather gives the palm to Burke, quoting Smith's " If the project (of Empire) cannot be completed, it ought to be given up." To this might be added

Smith's more positive and certainly prescient argument " By thus parting good friends, the natural affection of the colonies of the mother country . . . would quickly revive." They might " become our most faithful, affectionate, and generous allies."

Equally welcome is the less known essay on Samuel Crumpe and F. M. Eden. Fay quotes Marx: " Sir F. M. Eden is the only disciple of Adam Smith during the eighteenth century that produced any work of importance." He himself adds " Strong testimony; for over Eden bridge ' labour commanding ' passes into surplus value " (an example of the many Faylicities scattered through the volume). The closest link between Crumpe, Eden and Smith is, however, their common sympathy for " labour." " Crumpe, like his master," says Fay, " was of the elect few, a believer in high wages." This, as well as Smith's ideas on consumption, have been overshadowed by the much greater influence of his theory of value and prices. Fay also quotes Eden's blunt statement on Smith's law of settlement theories: " It is much to be regretted that this great political writer did not provide any evidence of the truth of these asseverations " (such as " in many large incorporated towns, no tolerable workmen are to be found " . . .). Is it possible that the difficulty of establishing James Watt, even in Glasgow University, may have over-influenced Smith's judgment?

Third comes a note on " Early Years of the Glasgow Chamber of Commerce " (founded 1783). Here Dr. Fay plausibly suggests that Thomas Tooke did not start the Free Trade Movement. It was launched in the 1780s; and he quotes Chamber reports of 1788 and 1790, concluding that the theoretical stimulus came from Adam Smith. Convincing evidence for this exists in the rich club life of the booming town, in which Smith partook along with the founders of the Chamber.

The rest of the book draws its analogies from Customs records, mainly in Newcastle and Swansea. How can one suggest its strange riches? We enter an Aladdin's cave of tricks and ingenuities from " combinations of masters," and especially from smugglers, which mere fiction lovers would not swallow. Timber, tobacco and coal head the chapters. We move between press gangs, plague ships, alcohol, even smuggling petticoats. It is Hogarth and Rowlandson. That there is only one brief extract from Scottish records is surprising in view of Smith's last post. Your reviewer knows they were studied. He recently received this card: " Scottish Customs. Thursday, July 23, 1778. Adam Smith in the Chair. Was horrified to find that *McPhie* (a Customs officer) was ' in the pay of the smugglers.' " It is good to know that free enterprise was so vigorous and resourceful, even then.

Those who are privileged to meet Dr. Fay know that he has now reached the summit in scholarship. He can live and talk in that fine circle of eighteenth-century " clubbable men," and can introduce us to their company. He can be at once episodic, revealing and precise. This is economic history for epicures.

From the University of Virginia come, under the title of *Intelligence and Democratic Action*, five lectures "somewhat hastily revised by Professor Knight," who surely must be the foremost champion of liberal rationalism in modern political literature. Such lectures are no place for technical analysis. But their author has always been so original, rich and wide in his thinking that such a plain statement of his position cannot fail to stimulate younger students and hearten the older ones. All will join the editors in hoping that this will indeed be "an extended preface" to "a more formal treatise" to come.

With what whole-hearted consistency Knight presses his rationalist philosophy can be judged from the following: "In a free country there cannot be any such thing as sacred truth or any dogma." More positively: "The essence of the whole liberal view of life is truth seeking," though he adds that education for the *will* (to be intelligent) is the vital need. This is because men are still more swayed by emotion than by reason. We are in fact only starting on the road of freedom, and we begin as aggressive incurably romantic prejudiced creatures, "gangsters," indeed, with "a vast capacity . . . to believe in accord with a selfish interest." This road to freedom, our author stresses, opened only recently in the long roll of history. It stems from the Renaissance and the Enlightenment. These represent a unique turn from the "obedience and conformity" of earlier centuries to the exciting but dangerous brew of "freedom and progress." Any hope of success, he insists, depends on our knowing both history and the basic ethical principles, and so coming to realise at once what is possible and what is humanly desirable. The only comfort he offers at this perilous corner is freedom from the deadening dogma of original sin. For in the rationalist world there are no such absolutes. (Yet some recognition of what we may call relative sin is detected in the phrase "I do not think people usually seriously violate standards they recognise as right.") But "prejudice" (the rationalist sin) can be exorcised only by free discussion, and the determination, having "compared the alternatives," to choose what is rationally better.

Economic thought and practice appear in this setting as at once a guide and a warning. The free market is both an ideal and to some small extent a modern achievement. Its technical virtue is that it allows anyone to secure his aim by agreeing with another on one essential only (exchange at the free-market price), thus not requiring that more general and usually very difficult agreement exacted by, for instance, political action. So economic analysis has worked out a clear system of thought which accurately interprets more obvious common sense. But the actual limits on free marketing are immense, since they spring from our so prejudiced natures. They all stem from power which can be irresponsibly used—such as monopoly used restrictively (two of the most harmful may arise in farming and trade unions, because they are relatively uncontrolled); the general need to work through agents; and the inevitable tendency, given the facts of human nature

and conditions on this planet, for distribution and therefore economic power to become more uneven. State control is therefore inevitable; but not, he insists, restrictive control of enterprise. As the spur to progress, enterprise requires special encouragement. For you cannot force free enterprise to take risks on unfavourable terms. And it is better that the losses should be borne by enterprise than by the community (which must anyway work through potentially irresponsible agents).

Economic man is, however, only one facet of the full man, this being the main inadequacy of economic efficiency. Briefly, we are at least as much motivated by any one of beauty, taste, exploration (even danger), sport, gambling, culture, friendship. The final issue for social progress rests therefore between all these values. Here order, law, freedom, efficiency, justice, culture co-operate, but also jostle. Our economic method can at least supply an excellent guide for choice. In politics this can proceed only through very imperfect substitutes of representation and agency. In the long run societies can improve only as the will to use intelligence grows—and this depends on educating the will to be intelligent.

This review has sought to whet the appetite by suggesting the verve, width and vigour of the thought. Here we have the authentic Uncle Sam in mental ferment: tough, wiry, respecter of no mere dogmas nor persons, ardent for the truth and its servant reason, the friend of all men, genuine in pity. It is a *Credo* that warms the heart and strengthens the will.

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Fluctuations in Trade, Industry and Finance: a Study of British Economic Development, 1850–1860. By J. R. T. HUGHES. (Oxford: Clarendon Press, 1960. Pp. xviii + 344. 45*s.*)

THE interpretation of economic history demands several different kinds of work, and the blending of different techniques and skills. There is the detailed study of a particular industry or locality, using unpublished or inaccessible material to " discover " new factual information; there is the intensive study of a whole economy during a short period of time to show the interaction of various economic forces; and there is the broad long-ranging view aiming to show developments in the national or international economy in perspective over a long time period, and so to elucidate the processes of economic growth. Dr. Hughes' book is of the second kind; he makes only the briefest " background " excursions outside the decade he has chosen; he uses, apart from some records of the Bank of England, only published material; but he has drawn upon a great variety of sources, he brings to bear upon them a mind obviously well versed in modern economic theory, and he develops his arguments with skill and assurance.

An opening chapter fills in the background to the decade, stressing the

forces of expansion and discussing the income-generating effects of the gold discoveries and of war. There follows a long chapter on foreign trade, in which the official figures are used in some detail to show changes in the amount, direction and terms of trade. In the main body of this chapter Dr. Hughes assumes that the visible trade balance gives an accurate indication of the current account balance as a whole, and hence explains the drain on the Bank of England reserve in 1853–54 and in 1857 as due to gold exports brought about by a rising import bill. A note at the end of the chapter draws attention to Imlah's estimate showing a current account surplus for 1857, and concludes that in this case the drain on the Bank's reserve must have been internal. There is still an element of mystery here for future research to clear up. Perhaps part of the answer lies in short-term capital movements associated with the very high rates prevailing at the time in New York.

A very detailed chapter on the cotton industry leads to an interesting hypothesis about fluctuations. In an industry depending on an agricultural raw material where the short-run supply elasticity is low, a sudden wave of investment (induced by the opening up of new markets or by technical innovation) is likely to lead to a sharp rise in material prices. If the material forms an important part of total costs, and if the market for the product is not strong enough to sustain a rise in price, profit margins might be cut to a point at which the industry cannot operate at its enhanced level of capacity, so that there would be a cutback in output and a sharp contraction of investment, continuing until material supplies had adjusted themselves. Dr. Hughes produces strong evidence that this happened in cotton with large investment in the early fifties, followed by rising material prices with fairly stable prices for the final product, leading to organised short-time working in 1857 and then, after a short period of stagnation and falling material prices, to a new upsurge in investment and production at the end of the decade. He also finds some evidence of a similar pattern in other textiles and leather, and shows the strong contrast between these industries and coal, iron and shipbuilding.

Dr. Hughes maintains that railway investment was comparatively unimportant in the 1850s. Clearly it was a much less dominant influence than in the previous decade, though there is something very odd about the figures of Table 85. Other industrial sectors are discussed only briefly, largely for lack of quantitative information.

Finally, there is a long chapter on the monetary system with appendices on the Bank of England in the 1857 crisis and on the affairs of the big joint-stock banks that failed. Here, the main difference between Dr. Hughes and earlier writers is one of emphasis. He rightly calls attention to the importance of Bank of England lending to the banks and merchants as well as to the discount market. He stresses even more than most earlier writers the expansion of bank credit and bills of exchange. Here, he seems slightly to

overstate his case; for example, he uses the deposit figures of London joint-stock banks, which were growing much more rapidly than deposits as a whole, and of bills, he says, " In general it is seen that bill creations increased as the discount rate rose and declined as the discount rate fell. It is clear that the creation of bills in the 1856–7 boom was uninhibited by rising discount rates "; the first part of the statement is, of course, broadly true, but the second does not follow necessarily from it. In my own view, Dr. Hughes also slightly overstates the extent to which the Bank was motivated by concern for its own earnings and gives it rather too little credit for the extent to which it was already assuming central banking responsibilities, but this is a matter on which the evidence is imponderable, and it is impossible to feel certain.

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Imperfect Collusion in the Cement Industry. By S. M. Loescher. (Cambridge, Mass.: Harvard University Press, 1959. Pp. ix + 331. 40*s*.)

Imperfect Collusion is an attractive but rather imprecise concept with two main elements. First the collusion is imperfect in that it has limited objectives; in the cement case the objective was uniformity of prices, which in turn promoted stability of prices. Second, collusion is imperfect in that it is unorganised and depends upon such influences as trade ethics and voluntary short-period self-denial rather than a comprehensive central organisation. Although Professor Loescher claims that his concept " differs markedly from the concept of incomplete ' spontaneous co-ordination,' collusion in the broad sense, propounded by William J. Fellner," the two sets of ideas are closely related.

The first two thirds of the book contain a very lively and illuminating analysis of marketing in the cement industry. The weighting of the many features of the industry is thoroughly convincing, and the pattern of analysis is admirably adapted for the problems discussed, and there is very little surplus detail. Professor Loescher shows that discriminatory price cutting (leading to lower average prices) can be severe, because marginal costs are low, and painful, because fixed variable costs are high, and the cash drain can therefore be high when plant is under-utilised. In order to maintain sales, firms wish to meet all competition, but they find it difficult to do so. First, trucking costs to the individual are variable and uncertain, and there are considerable differences between average and marginal costs. The instability and the variations in trucking costs lead to uncertainty about delivered prices and make it impossible to meet all competition. Secondly, trading direct with contractors, many of whom are once and for all large customers in a particular district, gives the contractor a strong bargaining position and opens the way to widespread secret prices and rebates and to rumours which frighten manufacturers into further price reductions.

The thesis is that "imperfect collusion is adopted to perfect a common geographic pricing formula which will enable rational oligopolists to make the best of a difficult situation and to realise the benefits which accrue from the recognition of their interdependance" (p. 26), or, put differently—

> "The common use of the system is best described by the euphemism 'defensive monopoly' since its purpose was to systematise the process of quoting prices for a multitude of geographically dispersed destinations, so that all sellers would *know* the competition to be met and could exercise the kind of self restraint in pricing policy posited by simple oligopoly theory" (p. 84).

Pursuing these objectives, the industry managed to make general the policy of selling at base price plus standard freight rate and selling only to dealers and to the Government, State or local authorities. This policy eliminated both uncertainty about trucking costs and it eliminated the market most subject to unsystematic discriminatory price cuts. Professor Loescher's description of the importance of these two restrictions is highly illuminating.

The second part of the book is somewhat surprising. After a sympathetic analysis both of the causes of intense competition and the reason why the firms are so anxious to mitigate it, Professor Loescher suddenly reveals himself as the most out-and-out exponent of the promotion of intense competition. He condemns the basing point system and then asks "what alternatives are possible?" and, "in response to changing conditions of the market, which one is the most likely to induce the greatest uncertainty and competitive pressure on prices?" He is thoroughly suspicious of any price rigidity, and believes that by prohibiting any restrictions which make it possible for firms to meet each other's competition, he will promote unsystematic price cutting and thus make prices flexible.

He is entirely logical in that he approves of high prices in a boom, and wonders whether they have in fact been high enough to offset the losses which would be incurred were the industry to compete strongly during a recession. Further, he approves the slow growth in capacity between 1945 and 1956 on the grounds that the uncertainty promoted caution and prevented waste of the type seen in the form of over-capacity in the 1930s. He attributed this over-capacity to the rigid prices and does not analyse the other reasons for excess capacity, the most important of which may well be the technical change giving larger optimum size of plant.

Professor Loescher does not recognise the possibility that chaotic intense competition might not be desirable, that risk bearing is expensive, that fluctuating prices lead to speculation, that shopping around is costly and that secret pricing is opened to graft, confusion and dishonesty. On p. 235 he quotes J. M. Clark on the subject of excessive price competition but makes no comment.

The general question as to whether or not maximum competition is desirable is an important one. This book is a clear and explicit contribution in support of maximum competition. It is, however, a pity that the problem is not explained, for the reader, unless already convinced, struggles for balanced judgment.

The American cement industry offers clear-cut examples of a number of important economic problems, and it is extremly well documented. It is therefore an excellent field in which to thrash out important points of economic principle. This book is an interesting contribution to the discussion, and emphasises important aspects of competitive behaviour which have often been neglected.

P. LESLEY COOK

Newnham College,
Cambridge.

Tin Cans and Tin Plate. A study of competition in two related markets. By J. W. McKIE. (Cambridge, Mass.: Harvard University Press, 1959 (London: Oxford University Press, 1960). Pp. xv + 321. 60*s*.)

THIS is the fifth of a series of studies on competition and monopoly in American industry which has been financed by a grant from the Merrill Foundation for the Advancement of Financial Knowledge. As the central object of the whole project is an evaluation of monopoly policy in the United States, this volume, like its predecessors, is concerned to establish to what extent public policy has been successful in promoting "workable competition"—market patterns in which adequate performance is compelled by market structure.

The key event in the can manufacturing industry was the anti-trust decision of 1950, which made illegal many practices which had grown up in the supply of tin cans. In particular, it was held that tying arrangements between can-makers and can-users, such as long-term contracts and the leasing of can-closing machinery, had limited competition in can manufacture by making entry into the industry difficult. Since 1950 in consequence of the court decision, as Professor McKie demonstrates, there has been a marked decrease in exclusive buying of cans, the ability of the American Can Company, the major producer, to control prices has declined and the production of can-making machinery by other firms has been stimulated. The court judgment has also encouraged more canners to make their own cans as well as assisted in the growth of a third can-maker, the National Can Company. Professor McKie therefore concludes that "there are more signs in the industry's environment favorable to the development of workable competition than there have been for fifty years." But there is no sign that the court decision has made entry into the industry easier, and profits have been maintained.

Professor McKie devotes most of his attention to the can industry, but he also argues that, as the links with tinplate manufacture are close, the two industries ought to be considered together. Research and innovation in metal containers has gone hand in hand with developments in tinplate manufacture. The tinplate industry now consists almost entirely of large plants, integrated with steelworks. Here, too, entry is difficult. In fact, only one new firm has entered the industry since 1930, a development which took place with government backing during the war to remedy the shortage of tinplate on the Pacific Coast. Though Professor McKie is perhaps a little more sanguine about the possibility of outsiders entering the tinplate industry than the situation warrants, the only real possibility he offers is of can manufacturers integrating back. He seems to suggest that the purchase of tinplate in coils by can-makers is a step in this direction. But it is not so regarded by at least some American tinplate producers. They welcome this extra investment in what they regard as the handling rather than the manufacture of tinplate in the hope that this will encourage can-makers to spread their orders more evenly over the year instead of concentrating them into the customary seasonal peak in order to keep this equipment in operation. In this case, legal checks may have operated in a negative way by preventing any further reduction in the number of tinplate makers.

Altogether this is a workmanlike study of the two industries. His exposition is less theoretically sophisticated than his opening chapters, but is clearly set out. Since this book was completed in 1957—it has been a long time in the press—interest has moved from the vertical to the horizontal. Of greater importance from the point of view of public policy has been the intensified competition in the last two or three years between the various packaging materials. It is the intense rivalry between glass, paper, plastics, aluminium and tinplate rather than legal restraints which are serving to create that " workable competition " which it was Professor McKie's concern to discuss.

W. E. Minchinton

University College of Swansea.

The Economy of Scotland in its European Setting, 1550–1625. By S. G. E. Lythe. (Edinburgh and London: Oliver & Boyd, 1960. Pp. viii + 277. 21*s.*)

The dates in the title of this book may seem a little arbitrary, but they have been chosen with good reason. 1560 was a notable year in Scots history, not least because it saw the first English army ever to cross the border into Scotland with friendly intentions. And 1626, as Mr. Lythe points out, saw the active participation of Scots troops in war against the French, " the last straw on the back of the Old Alliance " (p. 211). These dates, like 1603 and 1707, are therefore at least partly political. It is indeed the chief merit

of this book that the need to found economic development upon a reasonable degree of political organisation is made so clear. Scotland in the first half of the sixteenth century was a battlefield of warring interests. In the reign of James VI the Crown got the upper hand, and after his departure to London in 1603 the King ruled the country. " This I must say for Scotland," he wrote, " and I may trewly vaunt it; Here I sit and governe it with my Pen, I write and it is done, and by a Clearke of the Council I governe Scotland now, which others could not doe by the sword." The advantages of firm rule were the general but the inestimable advantages of public peace. They were not bought without a cost. In exactly the period covered by this study, Scotland had to transform herself from being an economy oriented to trade with North-Western Europe and France into one oriented to trade with North-Western Europe and England. This change was full of difficulty. It was made gradually but in the end successfully, and one of Mr. Lythe's most interesting suggestions is that it was assisted by deterioration in Scotland's commodity terms of trade with France.

The considerable internal development which accompanied these trade and political changes was mainly in the fields of coal and salt production. It is correspondingly regrettable that only five pages are devoted to these two topics. It is even more disappointing to find Nef's twenty-five-year-old estimates of Scots coal exports between 1551 and 1640, " admittedly speculative " (p. 48), quoted without alteration or suggested improvements. It is perhaps the lack of quantitive verification which makes Mr. Lythe's picture of sixteenth-century Scotland more like a picture of eighteenth-century Scotland than it ought to be. We hear about coal production; salt production; a textile industry " of considerable stature " (p. 39); soap making, glass making, brewing, lead mining and so on. Most of these activities were on a very small scale, but this is not the impression left by the book as a whole. Industry was also well concentrated. The Scotland of this book is to a large degree an area bounded by a line joining North Berwick, Linlithgow, Perth and Dundee. Of course there was a concentration of population in that area, and of production for the market; but the bulk of the people remained on the land, illiterate and immobile.

One topic is treated in a way which is definitely unsatisfactory: the behaviour of prices. The author begins by giving his implicit approval to the familiar view that in Tudor and Stuart England the " great upward heave of prices . . . encouraged the producer of goods by the prospect of higher gain " (p. 24); and he goes on to consider whether this " stimulus " operated also in Scotland. His figures, if they are accepted, are startling. A threefold increase in the price of necessaries took place, he says (p. 30), between 1560 and the early 1600s. Later, there is the " prime deduction " (p. 110) that " the price of Scottish domestic produce increased at least fourfold " between 1550 and 1625. Most of the rise occurred between 1575 and 1600, when prices (judging by the few figures given) doubled or more nearly

trebled. All these rates of increase are far faster than the rates usually quoted for England for the same decades, and the reader is left wondering about the consequences for Scottish overseas trade. The author says nothing about this, but he seems to entertain occasional doubts about the doctrine of the beneficent effects of rising prices on internal development: "commodity prices staggered violently upwards [1570–1600], destroying confidence and disrupting traditional relationships in every sector of the economy" (p. 63). In the next paragraph the price rise from 1600 to 1625 is described as "a healthy stimulant to enterprise"; but this price rise, according to the author (p. 110), "was everywhere slight and, for some commodities, negligible." We seem to approach that ideal situation, in which prices are always rising but are never any higher.

This will not do. For over a quarter of a century, economic historians have accepted without question the doctrine, popularised in Keynes's *Treatise on Money*, that rising prices promote economic development. Instead of examining this idea, they have, on the whole, vulgarised it. Mr. Lythe's doubts and near-contradictions stem from the fact that he, like so many other writers, has failed to examine relative as well as "general" price changes, and to analyse their consequences with proper care.

Nonetheless, despite the few weaknesses which have been mentioned, this is a scholarly book, readable and eminently well organised. It is a welcome addition to the small collection of works on the economic history of Scotland.

A. J. YOUNGSON

University of Edinburgh.

A History of Labour in Sheffield. By S. POLLARD. (Liverpool: Liverpool University Press, 1959. Pp. xx + 372. 35*s*.)

Most histories of labour are concerned with the politically articulate. They tend to concentrate also on the evolution of "movements," usually treated in broad terms and on a national or international level. Dr. Pollard's careful and painstaking study is a welcome innovation. It is concerned with conditions of work and ways of life as well as with economic and political developments, and its material relates to what is perhaps the most "working-class" of all English industrial cities, Sheffield. Part One deals with Sheffield and its industries in the middle of the nineteenth century; Part Two covers both the expansion of the Sheffield trades and the rise of the steel industry in the delayed local industrial revolution and the "great depression" (the latter is dealt with somewhat briefly); Part Three is a study of the years 1893–1914, years of uneven economic development but substantial social pressure; and Part Four is an examination of the First World War and the inter-war years. The book ends rather abruptly with a chapter on the light trades in depression. The material is so well documented and so tightly compact that a general conclusion would have been

helpful to the reader. An account of Sheffield in 1939 to counterbalance the excellent account of Sheffield in 1850 might have served to round off the study. We are left with the general picture (tucked away in a paragraph) that: " Sheffield was still a crowded, smoky city, containing many dangerous occupations and having one of the highest proportions of unemployment in the country." Housing, which might provide the basis for a topographical contrast, is dealt with only in statistical terms.

Dr. Pollard's use of statistics is the key to his method throughout. He makes good use of nineteenth-century statistics, culling them from a large number of sources, including official reports, local investigations, newspapers and journals, and studies by social commentators, among them Le Play and the Webbs. The key set of economic statistics is that relating to earnings: these determined the level of the working-class standard of life. Appendix A is an admirable detailed study of earnings and employment in the twentieth century. The figures reveal the influence both of trade-union and national policies on Sheffield life. Health statistics are used to illuminate the chances of life and death: there is one interesting table on illness among Sheffield grinders in 1842 and much useful twentieth-century material. Even in relation to the twentieth century Dr. Pollard suggests that the improvement of sanitary engineering has been one of the main causes of improvement in mortality rates, a point overlooked by some historians of public health. Statistics of hours of work are also given, but the treatment of leisure activities—the style of working-class life—is a little disappointing. No reference is made, for example, to football, a major preoccupation in Sheffield, and whereas in the account of health and welfare attention is paid to the shift from local policy making to national policy making as a main factor in social progress, there is no account in the sections on leisure of the shift from locally directed leisure to " mass culture." The cinema is disposed of in two places in half a sentence, and religion, which was discussed in Chapter I and re-examined on the eve of the First World War, disappears in the final section. In other words, the quality of life in Sheffield receives less attention than the measurable determinants of working-class existence.

This emphasis would not be shared by all writers on the local history of labour. At the same time few writers would dissent from Dr. Pollard's general sentiments, clearly expressed in his preface—first, that " no history can be balanced if, in a concern with the mighty and the eminent, it neglects the common man " and second, that " the student of the history of the common people has to recognise that he is dealing, not so much with the making of decisions as with the reactions to decisions made by others." The second sentiment raises the practical question of how far the historian of working-class life, particularly when it is considered in local terms, can neglect middle-class life. The absence of forthright middle-class leadership in nineteenth-century Sheffield contrasts forcibly with conditions in Birming-

ham. The parallel between Sheffield and Birmingham, which Dr. Pollard discusses briefly, is worth pursuing further precisely because certain features of working-class existence are dictated from above. It raises questions both of class relations at the factory level and leadership in local government. Statistics are helpful here only as one historical source. The literature of contemporary comment—some writers were very shrewd on seizing imaginatively the differences in tone and feeling between different cities they visited—is particularly valuable to the historian both of cities and of labour.

Dr. Pollard's achievement is considerable, however, and he has pointed the way to many further studies. Not the least interest of the particular study with which he has been concerned is the contrast within Sheffield itself. The localised light Sheffield trades were carried on in small units. Little capital was deployed, but there was traditional skill. Heavy industry, as it developed, depended on large plant and costly equipment, on new techniques rather than old crafts, and on pressures from outside more than local initiative. This contrast provides the main theme in modern Sheffield history, whether the history is viewed structurally at particular periods of time or chronologically as a sequence. Further studies by other writers might usefully compare and contrast this economic profile with the economic profile of other industrial communities: general history as well as labour history would certainly benefit greatly from such research.

ASA BRIGGS

University of Leeds.

The Economic Background to Investment. By H. B. ROSE. (London: Cambridge University Press for the Institute of Actuaries and the Faculty of Actuaries, 1960. Pp. xi + 661. 40*s*.)

THIS book is intended primarily for actuarial students, and secondly, for practising actuaries in charge of life-assurance or pension funds. Its general plan is to examine financial and investment questions at some length against a broad sketch of the economic background, and it assumes no previous technical knowledge in the reader. By covering a wide range of subjects in this way, the author hopes to relieve the student of the necessity of reading a long list of introductory text-books.

Mr. Rose's exposition is clear and thorough; even if at times—notably when dealing with inequality of incomes (pp. 105–6) and speculation (pp. 307–13)—his willingness to express his own views on controversial issues makes him longer and duller than he needs to be. There are very few actual errors, but one I found alarming was the suggestion that companies with high gearing tend to be less attractive investments in a period of inflation. Holders of investment-trust Ordinary Shares over the last twenty years know very well that this is not so.

The structure of the book is less satisfactory. It is divided into eight

parts: (1) The Competitive Market Economy; (2) Private Finance and the Capital Market; (3) Introduction to Public Finance; (4) The Banking System and Monetary Policy; (5) The Determination of Security Prices; (6) National Income and its Fluctuations; (7) International Trade and Payments; and (8) Government Policy and Economic Stability. This arrangement has two serious disadvantages. The first is that the technical parts (2–5) are sandwiched between one at the beginning and three at the end dealing with the general economic background. The second is that as the last part is a background one there is no climax to lead up to, the final chapter being on "Interest Rates and the First World War."

These difficulties, it seems, could easily have been avoided. As the book now stands, the last chapter in Part 5 is on "Ordinary Share Yields and Prices," which presumably is what the budding actuary wants to end up by knowing about. If this had been placed last, and the rest of the material rearranged roughly in the order of its remoteness from it, Mr. Rose would have had both a more logical structure and some sort of a climax to work up to. The material would then fall readily enough into three parts: (1) Background; (2) Government Policy; and (3) The Capital Market and Security Prices. Part 1 would comprise National Income (without its fluctuations), the Competitive Market Economy, and International Trade and Payments; Part 2 would comprise Government Policy and Economic Stability (including, naturally, fluctuations in national income), Public Finance, and the Banking System and Monetary Policy; and Part 3 would end the story with Private Finance and the Capital Market, and the Determination of Security Prices. All the background chapters would come before all the technical ones.

Some such re-arrangement would have made it much easier for students to read the book straight through, but even then they would have found it a help to have read the usual introductory text-books before attempting to do so. The best of these are much more aware of the difficulties which beginners, through the depths of their ignorance, are up against than Mr. Rose shows himself to be. In spite of the technical clarity and accuracy of his exposition, I at least (though no longer a beginner) found some of his chapters very stiff reading. The reason is that the argument tends to be too compressed; but while this is a weakness in an introductory text-book, it is a virtue in a work of reference. Faults of structure are also less important there. It is when the students at whom Mr. Rose is aiming are about to sit their examinations and wish to brush up their knowledge of particular topics, that they are likely to find his book most useful.

C. H. P. GIFFORD

Geneva.

NOTES AND MEMORANDA

REAL BALANCES, EXPECTATIONS AND EMPLOYMENT: A COMMENT

In a recent note in the Economic Journal, Professor Kenneth K. Kurihara has argued that "it is not sufficient to postulate the 'real balance effect' *à la* Pigou or Patinkin in order to restore a full-employment position."[1] He intended "to correct the misleading impression that Patinkin has effectively 'repudiated' Keynes' theory of underemployment equilibrium."[2] Kurihara's argument is easily stated; since wage and price reductions may lead to expectations of further reductions, deflation need not increase aggregate demand, even though the Pigou effect were operating.[3]

Kurihara has erred in assuming that what might be true for a while would continue to be true indefinitely. The stimulating effects of increases in net claims against the Government might be temporarily offset, or even more than offset, by expectations of further price decreases. But, if the real value of net claims were made sufficiently large, demand would always be enough to buy output at full employment, no matter how great the expected reduction in prices.

This can be made clear by considering two possible cases. First, imagine that prices are expected to fall by $X\%$ per period. As a consequence, the initial effect of reductions in wages and prices might not be an increase in real demand; real demand might even fall. So long as demand is insufficient, however, prices would continue to fall; the real value of net claims against the Government would continue to increase. Eventually the increase in real balances is bound to be great enough to more than compensate for the reduction in demand that results from an expectation that prices will fall by $X\%$. Second, as prices continue to fall, the expected change in future prices might become larger and larger. It would appear at first sight that the real value of the net claim might become indefinitely large as the expected percentage change in prices became indefinitely large, without real demand increasing. This argument would imply, however, that, even when a penny became sufficient to buy

[1] June 1960, p. 324.

[2] *Loc. cit.*

[3] Kurihara is not the first to see this difficulty. See, for example: Philip Neff, "Professor Friedman's Proposal: A Comment," *American Economic Review*, Vol. XXXIX, p. 947; Lawrence Klein, *The Keynesian Revolution* (1950), pp. 88–9, and "The Use of Econometric Models as a Guide to Economic Policy," *Econometrica*, Vol. XV, pp. 122–5; Don Patinkin, "Price Flexibility and Full Employment," *Readings in Monetary Theory* (1951), pp. 273, 278 and 281–2. Thomas Schelling considered the argument with considerable care in "The Dynamics of Price Flexibility," *American Economic Review*, September 1949, pp. 911–22.

ten times the entire national output, if prices were expected to fall in the future, nominal net claims against the Government of $200 billion might be insufficient to encourage the public to spend the tenth of 1¢ that is necessary to buy all that can be produced at full employment. I submit that this is placing too much importance on the ability of what is essentially an interest-rate effect to reduce aggregate demand. If the real value of the net claims became sufficiently large the public would not be concerned with how much more a trillionth of a cent not spent to-day would be worth to-morrow; what difference does it make if you already have more than enough to buy the world?

In brief, to eliminate unemployment, elastic price expectations may require a greater reduction in wages and prices than would be necessary if price expectations were unit elastic or inelastic, but the Pigou–Haberler–Scitovsky–Patinkin repudiation of Keynes' theory of unemployment equilibrium is valid even if price expectations are elastic and become increasingly elastic as prices fall. If the community became rich enough the demand for goods and services would be sufficient no matter how high the interest rate or how great the expected decline in prices.

ARNOLD COLLERY

Amherst College,
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REAL BALANCES: A FURTHER COMMENT

I HAVE never been able to convince myself that the "real balance effect"—ought this expression to be prefixed by the names of four revered economists?—is valid.

It is supposed that, if real balances become excessive, some will use the excess amounts for the purchase of commodities, thus serving to increase employment and the money value of the national income, whether through a rise in its volume or price level or both. This process is supposed to continue until the higher money value of the national income makes the value of outstanding real balances no longer seem excessive.

But this extra purchase of commodities is a once-over and transitory phenomenon. The extra employment given is in addition to that given by current continuing aggregate demand, as determined by the continuing propensity to consume and the propensity to invest. Consequently, when real balances reach their desired relation to income, employment and the price level will drop back to that supported by current continuing aggregate demand. When this happens, presumably real balances will, according to this way of thinking, again be excessive, and the process will be repeated. Thus the operation of the "real balance effect," as so far described, would lead to oscillation, and not to an equilibrium at a higher level of employment.

It appears to me that, within the framework of static concepts, Keynes gave the correct solution. To the extent that those with surplus balances seek to buy securities, this will raise the prices of securities and lower their yields. The various firms and households in the economy will accordingly readjust their holding of assets to suit their needs, and this will lead to a permanent equilibrium. If one mode of adjustment leads merely to oscillation and the other to equilibrium, one should regard the latter as the method by which stable equilibrium is eventually established. The re-establishment of equilibrium will lead to higher employment, only to the extent that the lower interest rate stimulates the propensity to invest, as Keynes explained.

Reverting to the purchase of commodities, I do not think that it would in fact lead to the oscillation described in the foregoing paragraph. In my *Trade Cycle* I went into this problem at some length and with considerable particularity in a passage which anticipated and, in my considered judgment, refuted the real cash balances doctrine.[1] Granting that in the first instance households, finding themselves with redundant cash, might spend it on commodities, I argued that this would go next into the coffers of firms. The firms would not be in a position to distribute this extra cash as dividends, since it would do no more than offset the lower value of their goods in process and thus would have to be retained (in some form) as an integral part of their capital assets, as required to balance their capital liabilities. Firms would either acquiesce in holding larger balances, which would thus be sterilised *pro tem*, or pay off overdrafts (thus reducing the quantity of money), or seek to buy securities (as postulated by Keynes). If the firms with excess balances used them to buy extra capital goods, which they had previously been withheld from purchasing owing to lack of finance, that would simply be part of the ordinary Keynesian effect—the existence of excess liquidity *can* stimulate employment to the extent that it causes an increase of investment.

In fine the excess purchasing by households would serve only as a temporary buffer on the downward path of employment and have no effect on the equilibrium finally reached.

The passage that I have briefly cited substantially accepts the Keynesian analysis as correct; but it is able to make some improvement on it by setting the problem in the framework of dynamic concepts.

R. F. HARROD

Christ Church,
Oxford.

[1] *The Trade Cycle*, by R. F. Harrod (The Clarendon Press, Oxford, 1936), pp. 125–38.

CURRENT TOPICS

THE Annual Meeting of the Royal Economic Society will be held on Thursday June 29, 1961, at 5 p.m. at the London School of Economics and Political Science. After formal business, Professor J. R. Hicks will address the Society.

WE offer our best wishes to Professor A. K. Cairncross, a member of our Council, on his appointment to succeed Sir Robert Hall, lately our President, as Economic Adviser to Her Majesty's Government.

THE Council of the Royal Economic Society has agreed to sponsor an edition of the papers and correspondence of William Stanley Jevons, to be prepared by Dr. R. D. Collison Black, of the Department of Economics, Queen's University, Belfast. Dr. Black has been given access to all the papers which are still in the custody of the Jevons family; these include letters from most of the leading economists of Jevons' time, but scarcely any copies of the letters which Jevons himself wrote. If any Fellows possess, or know the whereabouts of, any letters or papers by or concerning W. S. Jevons, will they please get in touch with Dr. Black?

IN reviewing Dr. B. H. Klein's study entitled *Germany's Economic Preparation for War*, Lord Dalton mistakenly described the author as " a German, apparently long resident in the United States ". It has been pointed out to us that Dr. Klein is an American citizen by birth, educated in the United States, who took an important part in the work of the Strategic Bombing Survey in 1945. Many of his American colleagues remain convinced that his estimates of German output, however surprising, are in fact near to the truth.

WE record with very great regret the death of Mrs. Honor Croome. Her first book *The Approach to Economics* has been for many generations of students their first elementary introduction to the subject. As an indefatigable writer and reviewer, particularly in the columns of *The Economist*, she had a firmly established place in the economic thinking of her generation. We offer our most sincere sympathy to her husband and family.

THE following have been admitted to Life Membership of the Society:

Chatterjee, Prof. B. B.	Newsham, W. M. Jnr.	Thompson, M. A.
La Anyane, S.	Sharps, J. G.	Zighdis, Dr. J. G.
Mohamed, C. A.		

THE following have been admitted to Fellowship of the Society:

Adegbulugbe, F. A.
Adeyela, J. O.
Akinbisehin, F. A.
Anderson, E. B. O.
Aridegbe, A.
Baez, Dr. G. D.
Barratt Brown, M.
Bickham, W. P.
Boi-Amporful, P.
Burnhill, G. C.
Callender, V.
Chandra, P.
Chang, J. L. Y.
Clarke, H. A. W.
Cohen, B. J.
Coombs, P.
Dawson, C.
Desabhandu, D. L. J.
Dost, Dr. Jeanne E.
Driver, G.
Ekpenyong, E.
Enders, T. O.
Evans, K.
Fashola, A. O.
Folz, Dr. W. E.
Ford, E. C.
Ford, J. L.
Foster, C. D.
Gluck, Dr. H.
Guillaumont, P.
Hacche, J. M.
Hambarde, W. R.
Hayes, Dr. F. J.
Hendy, J.
Hindocha, V. D.
Ho, E. D.
Hurst, J. E.
Idowu, J. O.
Israel, D. J.
Iwand, Asst. Prof. T.
Joslyn, A. S.
Kaka, K.
Kent, J. W. H.
Kenyon, N.
Lane, H. C.
Lindley, D. N.
Livy, B. L.
Luey, P.
Madjid, A. H.
Mathur, G.
McArthur, A. G.
McIndoe, C. T.
Mehrotra, R.
Michel, Prof. M.
Milligan, D. W. J.
Morris, M. A. V.
Neutze, G. M.
Ogunwolu, A.
O'Meachair, P.
Oviasu, H.
Pankhurst, K. V.
Parkinson, P. G. L.
Parsons, E. L.
Pitts, A.
Price, I. H.
Rafter, R.
Regan, B. L.
Regan, J. L.
Roberts, G. F.
Robinson, C. J.
Seth, Asst. Prof. K. C. G.
Shonubi, A. O.
Simister, L. T.
Soeria-Atmadja, H.
Stewart, A. J.
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No. 3, 1960. *On the Supreme Criterion of the Economic Efficiency of Capital Investments:* M. Usyk. *The Ratio of the Prices of Producers' to Consumers' Goods:* N. Petrakov. *On Labour Productivity under Socialism:* N. Strunevich. *Some Problems of Technical Progress in Construction:* L. Nikonova. *On the Working Capital of Collective Farms:* Ya. Kagner. *The New Purchase Prices and the Development of Collective-farm Production:* D. Korovyakovsky. *Problems of Improving the Distribution of Labour on Collective Farms at the Present Stage:* N. Khmelevsky. *On the Problem of Monopoly Profits:* G. Roginsky. *The Militarisation of the Economy as a Form of Revealing the Decay of Capitalism:* A. Nikolaev. *The Role of Foreign Capital in the Post-war Economic Development of Western Germany:* A. Stulov. *The Reactionary Character of Wittelmen's Revisionist Theory of the "Welfare State":* A. Melnikov. *Problems of the Basic Economic Law of Socialism:* L. Abalkin. *Editorial Comment. The Economic Grounds for the Applicability of Adaptation in Machine-tool Operations:* V. Chirkov. *Some Problems of Computing Life Assurance Premia:* E. Kagalovskaya. *Mathematical Methods in Economics:* V. Dadayan and Yu. Chernyak. *On Establishing Economic Balances for the Union Republics:* V. Vashentseva.

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No. 9, 1960. *Preparations for Changing the Price Scale Must Be under the Strict Control of the Financial Authorities:* V. GARBUZOV. *Strengthen Cost Accounting in Construction:* A. FERBERG. *Rapid Growth Rates of Socialist Production—the Base for an Increase in Popular Welfare:* I. TIKHONOV. *To Strengthen Financial Control:* K. KHALILOV. *New Measures to Stimulate Technical Progress:* YU. MARGULIS. *Once Again on Standards for Working Capital:* A. SPASSKY. *Strengthen the Revenue Base of Local Budgets:* A. LYANDO. *Financing Technical Progress in Hungarian Industry:* K. GEZA. *The All-Union Conference on the Mechanisation of the Work of Technicians and Managerial Staff. Problems of Planning Costs and Incentives (at a Meeting of the Scientific Council of the Finance Research Institute).*

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No. 9, 1960. *Activate Technical Advance with Credits. A Higher Level of Economic Work:* M. ZOTOV. *Accounts on the Acceptance and Accrediting Methods:* N. SHUMOV. *On Ways to Raise the Efficiency of the Mechanisation of Accounting and Computing Work in the State Bank:* N. KHLYNOV. *Ensure the Efficient Operation of the Bank in Conditions of the Seven-hour Working Day:* E. LEVITSKY, P. POTATUEV et al. *The Development and Strengthening of the Money and Credit System of the Democratic Republic of Viet-Nam:* LE VIET LUONG. *The Economy and Finances of the Republic of Guinea:* N. BARKOVSKY.

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No. 8, 1960. *Proceedings of the All-Union Conference on the Mechanisation of the Work of Technicians and Managerial Staff* (including papers by V. Starovsky, V. Siluyanov, Yu. Maksarev, S. Sasonov, M. Rakovsky and V. Elyutin). *The Territorial Comparison of Labour Productivity in Capitalist Countries:* L. Rozovsky. *New Standard Forms for Registering Fixed Assets:* I. Biryukov. *The Sampling Study of Value Indicators of Industrial Production:* V. Garmash. *A Meeting on Industrial Statistics in Geneva:* N. Grachev. *The Eleventh Session of the U.N. Statistical Commission:* T. R.

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No. 4, 1960. *Lenin's Contribution to the Theory of the Socialist Ownership of Means of Production:* B. Minc. *Lenin's Theory of Uneven Development and Contemporary Capitalism:* D. Sokolow. *Ways to Rationalise the Price System for Industrial Goods:* J. Gordon. *The Place of Consumers in a Planned Economy:* J. Zeiliński. *The Theory of Land Rent and Marginalism:* A. Runowicz. *An Attempt to Estimate the Long-period Demand for Energy in Poland:* J. Jędruszek. *A Comparative Study of Labour Efficiency in Building:* S. Kurowski. *The Influence of the State on Investment in a Capitalist System as Instanced by "Economic Planning" in France:* A. Szeworski. *The Post-war Structure of the World Credit and Capital Market and the Problem of the Dollar Deficit:* J. Rutkowski. *On a New Attempt in the Calculus of Investment Efficiency:* Cz. Grabowski.

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No. 6, 1960. *Some Problems of the Reform of Producer-goods Prices:* J. ZACHARIASZ. *Fundamentals of the Theory of the Socialist Enterprise:* B. MINC. *Some Problems of Production Cost and the Structure of Engineering Output:* R. WILCZEWSKI. *Co-ordination of the Production Sectors with the Supply Sectors:* B. WARZECHA. *Does a Single, Universal Formula for Export Efficiency Exist?—I:* J. JURIEWICZ. *Some Agricultural Problems in the Western and Northern Territories:* P. JANGECKI. *The Work Programmes of Regional Statistical Offices and Ways to Deepen Them:* S. KOWALSKI. *Economic Management by District Councils in Bulgaria:* W. KAWALEC. *Our Western Neighbour—the German Democratic Republic:* B. NAJNIGIER.

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No. 6, 1960. *The Progress of Our Economy in Fifteen Years of Popular Power. The Economic Aid of the Soviet Union in the Socialist Construction of Bulgaria:* A. Panov. *The Development of Bulgarian Industry and the Priority of the Growth of Producers' Goods over Consumers' Goods:* D. Davidov and I. Velev. *Our Socialist Agriculture:* P. Kiranov. *Finance and Socialist Construction:* K. Lazarov. *The Evolution of Economics since September 9, 1944:* Zh. Natan.

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No. 8, 1960. *Scope for a Fuller Utilisation of Productive Forces in the Extraction and Enrichment of Ores:* I. Bunzarov. *Some Indicators of Economic Efficiency in Engineering:* S. Khristov. *Our Reorganisation of Machine and Tractor Stations:* I. Nonchev. *Bulgarian Trade with Socialist Countries:* I. Tutev. *The Organisation and Planning of Material–Technical Supply under the New System of Production Management:* N. Chobanov.

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No. 8, 1960. *Some Characteristics and Advantages of the Socialist International Division of Labour:* M. Savov. *On the Mechanisation of House-building:* V. Stalev. *Irrigation—a Factor Raising Agricultural Yields:* B. Gurdev. *Bulgarian Trade Relations with Its Southern Neighbours, Greece and Turkey:* G. Popisakov. *The Use of the Balance Method in Regional Planning:* N. Vulev.

Finansi i Kredit (Bulgarian text)

No. 7, 1960. *For the Establishment of a Realistic and Productive Budget for 1961. Lessons of the 1959 Campaign on Balancing:* I. Khazan and D. Donchev. *For New Norms for the Working Capital of an Enterprise:* D. Matov. *On the Question of Credit Allocation to Enterprises for Material and Technical Supply:* G. Shopov. *To Ensure Scheduled Commissioning of Centrally Planned Investments:* I. Shishkov. *Some Conclusions on the Application of the Subsequent Acceptance System of Paying Accounts:* D. Alamanov. *Enterprise Funds in the European Peoples' Democracies:* D. Butakov. *Continuously Improve the Qualifications of Bank Officials:* M. Petrov.

No. 8, 1960. *For a Further Development and Expansion of Socialist Trade. For a More Active and Effective Financial and Economic Control:* G. Manev. *Reserve Funds in the Budgets of Local Councils:* S. Dragolevski. *The Regulation of Money Circulation in Khaskovo, Kurdzhali and Smolyan Districts:* M. Vulkov and N. Lazarov. *The Insurance Agent in the State Insurance System:* I. Iovkov. *Credit to Industrial Enterprises in Countries of the Socialist Camp:* D. Kasabov.

No. 9, 1960. *Prepare the Months of the Savings Campaign:* I. Paliiski. *Conclusions from the Audit of the Financial Operations of Some Regional Councils:* M. Stoyanov. *Over-expenditure of Wage Funds in Engineering Enterprises in Sofia:* D. Khristov. *Concerning the Economic Meaning and Sources of Funds for Basic and Current Repairs:* G. Khrisopulov. *Third Party Insurance:* K. Karagozov. *Urgent Problems:* R. Grutman. *Rises in the Cost-of-living Index in Some Capitalist Countries:* A. Stoichev.

Ekonomski Pregled (Serbo-Croat text, English summaries)

No. 6, 1960. *The System of Planning and Work in Econometric Models in Norway:* M. Sekulić. *Methods of Business Economics:* R. Bosner. *Marketing Policy in Industrial Enterprises:* J. Gojanović. *Regional Distribution of Fixed Assets of Economic Organisations, 1959:* R. B.

No. 7, 1960. *Proceedings of the Conference of the Association of Economists of Croatia on the Organisation and Economics of Forestry* (including papers by V. Lončar, M. Butković and M. Novaković).

No. 8, 1960. *Proceedings of the Conference of the Zagreb Branch of the Association of Economists of Croatia on the Formation of Net Income and the Fund of Personal Earnings in Industrial Enterprises* (including papers by M. Karoši, I. Gregurić, E. Semljak, D. Gustinčić and D. Golojuh). *National Wealth in the Territory of Zagreb:* I. Vinski.

No. 9, 1960. *Scientific Research in Business Economics:* F. Krajčević. *Trends of Production Costs of Sugar Beet in Croatia:* I. Dorčić. *Problems of the Cost-of-living Index and the Real Wage:* L. Sekelj.

No. 10, 1960. *Some Characteristics of World Timber Production Since the War:* A. Urbanovski. *Professionalisation in the Organs of Workers' Self-government:* M. Počer. *Prices and Production Costs of Maize in Croatia:* T. Borić.

Ekonomist (Serbo-Croat text, English summaries)

No. 3, 1960. *Problems of Centralised and Decentralised Methods of Investment Finance:* D. Milić. *Some Characteristics of the Composition and Geographical Distribution of Yugoslav Exports:* V. Pertot. *Structural Changes in Personal Consumption with Special Reference to the Results of Family Budget Studies:* V. Tričković. *The Law of the Priority Growth of Sector I Output in*

the Light of Technical Progress: R. STOJANOVIČ. *Agricultural Land Use in Yugoslavia:* N. DRAGIČEVIĆ. *Agriculture and the Construction of Fertilizer Factories:* V. STIPETIĆ. *Some Problems of Our Economic Periodicals:* B. ŠOŠKIĆ. *Demographic Research in Japan:* M. MACURA. *Radcliffe Report:* M. ČIROVI. *The Tenth Conference of Yugoslav Economics Faculties:* D. GAJIĆ. *The Second Plenary Session of the Association of Economists of Yugoslavia.*

Közgazdasági Szemle (Hungarian text, English and Russian summaries)

No. 8–9, 1960. *The Development and Present Position of Agricultural Production and Procurement:* V. SÁGHY. *The Second Five-year Plan for Foreign Trade:* GY. TALLÁS. *Imports of Raw Materials and Labour-intensive Exports:* I. VAJDA. *On the Problem of Economic Models:* A. BRÓDY. *Income Levels and the Production Structure in Agriculture:* F. VÁGI. *The Development of Our Agricultural Exports:* B. SZITÓ. *The New Forms of Retail Trade and Their Economic Efficiency:* A. KOLACSEK and T. KOLLÁR. *Methods for Determining the Economically Optimal Technology for Ferrous Metallurgy:* L. LUKÁCS. *The Level of Hungarian Industry at the Beginning of the Twentieth Century in the Light of a European Comparison:* I. BEREND and GY. RÁNKI. *The Theoretical Problems of the Construction of Communism in the Soviet Union—I:* K. BIRÓ. *The Godesberg Programme of German Social Democracy:* S. B. *International Comparison of the Purchasing Powers of Workers' Wages in the Iron, Steel and Coal Industries:* I. GERGELY. *The Struggle of the Communists for the Propagation and Purity of Marxist–Leninist Economic Theory, 1929–44:* Z. GERGŐ.

No. 10, 1960. *The System of Financial Incentives for Technicians:* L. OZSVALD. *Job Classification and Evaluation in Co-operative Farms:* L. KOMLÓ. *The Technical Development of Agriculture and the Economy of Production:* P. SZAKÁL. *Wages and Labour Units:* L. HALASI. *Socialist Industrialisation in the Korean People's Democratic Republic:* KIM SAN HAK. *Current Problems of the Socialist International Division of Labour:* S. BALÁZSY. *Theoretical Problems of the Construction of Communism in the Soviet Union—II:* K. BIRÓ.

No. 11, 1960. *The Economic Development of the Soviet Union and the Competition of the Two Systems:* GY. SIMON. *Transitional Forms and Solutions in Building up a Socialist System of Large-scale Farming:* E. CSIZMADIA. *The Utilisation of Input–Output Balances for an Investigation of the Appropriate Structure of Industry:* GY CUKOR and Z. ROMÁN. *A Critical Review of the Theory of Indifference Surfaces:* R. HOCH. *Some Economic Problems of Procurement and Price Policies for Agricultural Products:* J. SZABÓ. *The Productivity of Retail Trade by Co-operatives:* S. POLGAR and L. FALL. *A Comparison of the Economic Indexes of the Soviet Union and the U.S.A.:* D. SÓKY. *The Main Changes in the Economic Structure of the Underdeveloped Countries:* V. TYAGUNENKO. *The Significance of the Proposal for Total Disarmament for the Economic Development of Backward Countries:* A. ŽIŽKA.

Statisztikai Szemle (Hungarian text, quarterly English and Russian summaries)

AUGUST–SEPTEMBER 1960. *Cancer Mortality in Hungary:* Z. MARTON. *Some Problems of Mathematical Statistics in Worker-employee Income Surveys:* Ö. ÉLTETŐ. *A Statistical Examination of Fixed Assets in Hungarian Engineering—II:* M. SÁGI. *Mechanisation of Agricultural Labour in Co-operative Farms:* A. PELVA. *Methods Applied in the Statistical Survey of Alcoholism:* GY. VUKOVICH. *Compilation Problems of Input–Output Tables of Production and Distribution in the Soviet Economy:* M. EIDELMAN. *The Measurement of Labour Productivity in State Farms:* M. NÉMEDI. *Problems of Double Occupation in Borsod County:* M. KOVÁCS. *Town Gas Production in Hungary:* L. ORMAI. *The Centenary of the Swedish Central Statistical Office:* J. KÁRMAN. *Soviet Book and Periodical Publication in 1958:* E. VALKOVICS. *Regional Distribution of Employment in 1958:* K. LOSONCI. *Comparison of Productivity Between Enterprises.*

OCTOBER 1960. *Comparison of Economic Indicators of the U.S.S.R. and U.S.A.:* V. STAROVSKI. *Some Data on the Population of Hungary, 1958–9—I:* GY. ACSÁDI. *Application of the Sampling Method in Hungary:* G. PÁRNICZY. *Interdependence of Labour Productivity and Intensive Farming In Co-operative Farms:* L. MARKÓ. *A Statistical Survey of Menu Habits:* I. BARANYAI. *The Situation and Tasks of Management Statistics:* L. OLLÉ. *Quarrying in Hungary, 1950–9:* E. HUSZÁR. *The Spread of Television Viewing in Hungary:* T. ERDÉSZ and E. NAGY.

NOVEMBER 1960. *Trend of the Number of Skilled Industrial Workers:* J. TIMÁR. *Some Data on the Population of Hungary, 1958–9—II:* GY. ACSÁDI. *Some Problems of Budget Statistics:* A. SCHMIDT. *A Comparison of Socialist and Capitalist Systems of National Accounts:* A. MÓD. *A Sample Survey among Industrial Workers:* GY. BÁCS. *Housing and Cultural Conditions of Budapest University Students:* D. KOVÁCS. *Application of a New Method of Productivity Measurement in Norm-hours in the Building Industry:* M. RÉVFALVI.

Probleme Economice (Rumanian text, English, French and Russian summaries)

No. 7, 1960. *The Great Perspective of Economic Development:* V. Rausser. *Technical Progress and Its Economic Efficiency:* C. Tuzu. *Engineering—the Basis of Technical Progress in the Economy:* V. Actarian. *On the Way of Continuous Improvement of the Workers' Welfare:* S. Zeigher. *The Economic and Organisational Strengthening of Collective Farms—an Important Condition for the Consolidation and Extension of Socialist Productive Relationships in Villages:* D. Dimitriu. *The Theory of the "Affluent Society"—an Apologia for Contemporary Capitalism:* I. Adam. *Methods of Statistical Classification in the Economic Analysis of Agriculture:* M. Levente.

No. 8, 1960. *The Steady Development and Strengthening of Socialist Ownership:* M. Părăluță. *The Increase of Absolute Increments in Output in the Period of Completing the Construction of Socialism:* M. Oprișan. *The Economic Efficiency of Capital Works in the Chemical Industry:* M. Florescu. *The Better Utilisation of Timber Resources:* M. Suder. *The Role of Machine and Tractor Stations in the Economic and Organisational Consolidation of Collective Farms:* V. Topor. *Aspects of the Influence of the Socialist Transformation of Agriculture upon Rural Sales of Industrial Goods:* A. Horia and M. Stănescu. *Socialist Industrialisation in the Korean Democratic People's Republic:* Kim San Hak. *A Conference on New Phenomena in Contemporary Bourgeois Economies:* M. Horowitz.

No. 9, 1960. *A Major Rise of Ferrous Metallurgy:* D. Lazăr. *The Orientation of Investments in 1960–65:* R. Săveanu. *Automation and Problems of Skill Patterns:* P. Weiner. *For a Correct Utilisation of Funds Allocated for Capital Repairs:* I. Mihai. *The Role and Tasks of State Farms in the Development of Socialist Agriculture:* B. Șchiopu. *The Reactionary Character of the "Neo-serfdom" Theory of C. Dobrogeanu-Gherea:* N. Marcu. *Franco-West German Contradictions in the Western European Economic Communities:* A. Albu. *The Economy of the Democratic Republic of Viet-Nam in Full Development:* Nguyen Minh Chuong. *For a Deeper Treatment of Problems of the General Crisis of Capitalism:* I. Grădișteanu and Gh. Apostol. *The Method of Instantaneous Observations—a Useful System for Improving Utilisation of Working Time:* M. Stana.

NEW BOOKS

British

Ardener (E. and S.) and Warmington (W. A.). Plantation and Village in the Cameroons. London: Oxford University Press, for the Nigerian Institute of Social and Economic Research, 1960. 9″. Pp. xxxvi + 435. 50*s*.

[To be reviewed.]

Ashton (R.). The Crown and the Money Market, 1603–1640. London: Clarendon Press: Oxford University Press, 1960. 8½″. Pp. xvi + 223. 25*s*.

[To be reviewed.]

Ashworth (W.). An Economic History of England, 1870–1939. London: Methuen 1960. 8½″. Pp. vi + 438. 36*s*.

[To be reviewed.]

Bailey (F. G.). Tribe, Caste and Nation. A study of political activity and political change in highland Orissa. Manchester: Manchester University Press, 1960. 9″. Pp. xii + 279. 35*s*.

[Mr. Bailey is an anthropologist already known for his study of the Hindu village of Bisipara in *Caste and the Economic Frontier*. In this complementary volume the tribal Konds, particularly those living in the neighbouring village of Baderi, are put under the microscope. The approach is sociological, the evidence used largely case studies which illustrate tribal lineage, caste and customs. To the non-specialist the detail and jargon may, at times, be intimidating, but the light thrown on the social evolution and conflicting relationships of an ancient tribe in modern India makes this a valuable work.]

Bartlett (M. S.). Stochastic Population Models in Ecology and Epidemiology. London: Methuen, 1960. 7½″. Pp. x + 90. 12*s*. 6*d*.

[This monograph discusses a number of theoretical models for biological populations in contexts where a full stochastic formulation is advisable. Topics discussed include prey–predator systems, competition between species and epidemic theory.]

BENDIX (R.). Max Weber. An Intellectual Portrait. London: Heinemann, 1960. 8½". Pp. xi + 480. 30*s*.

[To be reviewed.]

BERLINER (J. S.). Soviet Economic Aid. London: The Bodley Head, 1960. 7" Pp. 61. 6*s*.

[This is an abridgment of the author's book under the same title published in this country by the Oxford University Press. It describes the forms taken by Soviet aid, estimates its amount and analyses the motives behind it.]

BOWLEY (M.). Innovations in Building Materials. An Economic Study. London: Duckworth, 1960. 8½". Pp. 446. 70*s*.

[To be reviewed.]

CAIRNCROSS (A. K.). Introduction to Economics. Third Edition. London: Butterworths, 1960. 8½". Pp. xii + 665. 20*s*.

[To be reviewed.]

Capital Investment. London: Unilever, 1960. 8½". Pp. 15.

[This year's Chairman's address contains some interesting statistical information on the distribution of Unilever investment between areas and between products and on the return on capital employed. It also contains some remarks—suggestive but rather general—on the reasons for the Unilever policy of internal finance, and on the considerations guiding the choice between alternative investment projects. It would have been interesting if the Chairman had felt able to say more about how the central management decides on the overall scale of investment activities within the group. How literally does he mean it when he says, " Our broad aim should be to keep the figure of return on capital rising rather than falling "?]

CARTER (C. F.). The Science of Wealth. An elementary textbook of economics. London: Edward Arnold, 1960. 8½". Pp. vii + 183. 14*s*.

[To be reviewed.]

CLARK (C.). The Economics of Irrigation in Dry Climates. Oxford: University of Oxford for the Agricultural Economics Research Institute, Parks Road, Oxford, 1960. 8½". Pp. 31. 5*s*.

[This pamphlet brings together a large mass of information about the return to irrigation and its cost in different parts of the world. It is found that the highest additional crop yields per unit of irrigation water are in the United States, where yields are high already. In assessing the worthwhileness of irrigation schemes in India and Pakistan, Mr. Clark rather surprisingly takes as a measure of net return not the resulting addition to output, but that portion of it which could be extracted in water-rents, apparently on the ground that the difference between the two represents the disutility to the cultivator of the extra labour needed to get the extra output. By this criterion some present irrigation projects are shown to be barely economic.]

COX (O. C.). The Foundations of Capitalism. London: Peter Owen, 1959. 9½". Pp. 500. 42*s*.

[To be reviewed.]

DIMOCK (M. E.). Administrative Vitality. The conflict with bureaucracy. London: Routledge & Kegan Paul, 1960. 9". Pp. xiii + 298. 25*s*.

[This is an essay on the factors making for continuing energy and growth in large corporations. As the author sees it, the main issue is how to combine the orderliness which is the characteristic merit of bureaucracy with the flexibility needed to prevent stagnation. Much of the book was written in England, and the case studies considered include Marks and Spencer and the British electricity industry.]

DUNNING (J. H.) and THOMAS (C. J.). British Industry. Change and Development in the Twentieth Century. London: Hutchinson & Co., 1961. 8½". Pp. 232. 30*s*.

[To be reviewed.]

EASTHAM (J. K.). Graphical Economics. London: English Universities Press, 1960. 9". Pp. xiv + 333. 25*s*.

[To be reviewed.]

EGERTON (R. A. D.). Investment Decisions under Uncertainty. Liverpool: University Press, 1960. 9″. Pp. 100. 18*s.* 6*d.*

[To be reviewed.]

FELLNER (W.). Emergence and Content of Modern Economic Analysis. London: McGraw-Hill, 1960. 9″. Pp. xiv + 459. 58*s.*

[To be reviewed.]

FRANKS (SIR O.). Some Reflections on Monetary Policy. Dorab Tata Memorial Lectures, 1960. London: Asia Publishing House (447 Strand, London W.C.2), 1960. 7½″. Pp. 72. 7*s.* 6*d.*

[These three lectures deal in turn with the objectives of monetary policy, the way it works and its international aspects. Sir Oliver Franks's treatment of these issues follows fairly closely the Report of the Radcliffe Committee, of which he was a member. The lectures may be recommended as an extremely clear statement of the Committee's main arguments and findings.]

GALBRAITH (J. K.). The Affluent Society. London: Hamish Hamilton, 1960. 8½″. Pp. xii + 288. 21*s.*

[To be reviewed.]

GALBRAITH (J. K.). The Liberal Hour. London: Hamish Hamilton, 1960. 8½″. Pp. 192. 18*s.*

[To be reviewed.]

HARROD (SIR ROY). Topical Comment. Essays in Dynamic Economics Applied. London: Macmillan, 1961. 9″. Pp. ix + 265. 25*s.*

[To be reviewed.]

HAZLEWOOD (A.) and HENDERSON (P. D.). Nyasaland. The Economics of Federation. Oxford: Basil Blackwell, 1960. 9½″. Pp. 91. 10*s.* 6*d.*

[To be reviewed.]

JONES (E.). A Social Geography of Belfast. London: Oxford University Press, 1960. 9″. Pp. xiv + 299. 35*s.*

[After an initial outline of the physical setting of Belfast and a brief but informative survey of its growth, the author analyses the geography of Belfast in terms of the distributions of industry, shopping facilities, residential land use, open spaces and accessibility to the city centre. The most interesting part of the book as a whole is the detailed analysis of population characteristics and religious persuasion in relation to distinctive areas or "urban regions" within the city. The last part of the book considers the extent to which theories of urban growth, notably those of Burgess and Hoyt, may be applied successfully to the socio-economic patterns of Belfast. To a certain extent the conceptions, both of concentric rings and of contrasted sectors, differentiated in the process of growth, are applicable to different parts of the city, but the differences in physical setting have also played an important part, and, more particularly, the values set on contrasting landscapes around the city centre at the time of building. In the detailed consideration of social data this book breaks new ground in social and urban geography in this country. The methods used and the conclusions reached will be of very great value in other urban studies.]

LYNCH (P.) and VAIZEY (J.). Guinness's Brewery in the Irish Economy. London: Cambridge University Press, 1960. 9½″. Pp. viii + 278. 35*s.*

[To be reviewed.]

MANCHESTER JOINT RESEARCH COUNCIL. Economic Aspects of Fuel and Power in British Industry. Manchester: Manchester University Press, 1960. 8½″. Pp. viii + 217. 25*s.*

[To be reviewed.]

MANNING (P.). A History of the National Investigation into the Economics of Milk Production 1934–1951. Oxford: The Agricultural Economics Research Institute, University of Oxford, 1960. 8½″. Pp. 83. 12*s.* 6*d.*

[This monograph is concerned with the scheme in use between 1934 and 1951 for calculating the cost of milk production. Milk was the first product in this country to which costing methods were applied on a large scale. The author describes the details of the scheme, the difficulties encountered and the degree of success achieved in its three uses—farm management, national policy formation and research into the economics of the industry.]

MANNING DACEY (W.). Money under Review. London: Hutchinson, 1960. 8½". Pp. 175. 25*s*.

[To be reviewed.]

MEADE (J. E.). A Neo-Classical Theory of Economic Growth. London: Allen & Unwin, 1961. 9". Pp. ix + 146. 25*s*.

[To be reviewed.]

P.E.P. Three Case Studies in Automation. London: P.E.P., 1957. 9½". Pp. vi + 48. 7*s*. 6*d*.

[These three case studies describe in some detail the impact of automation on methods of production and their consequences for labour and management. The approach is mainly non-quantitative, but some brief figures on economic aspects are included. One of the main conclusions drawn is that the introduction of automatic methods increases the need for detailed day to day planning of operations.]

POPPER (K. R.). The Poverty of Historicism. London: Routledge & Kegan Paul, 1957, reprinted 1960. 9". Pp. xi + 166. 16*s*.

[The great interest and lively discussion aroused by Professor Popper's famous articles in *Economica* fully justified their reissue in book form. The text has been revised and some additions made, but the argument stands. In the Preface Professor Popper says that he has now refuted historicism. "I have shown that, for strictly logical reasons, it is impossible for us to predict the future course of history." This refutation, which has been published in full elsewhere, is based on the fact that history is influenced by the growth of human knowledge, and it is impossible for us to know now what we shall only know in the future. Be that as it may, university teachers will be glad that this book is available, because it is a treasure-house of passages by the analysis and criticism of which the student can be helped to cut his academic wisdom teeth.]

PREST (J.). The Industrial Revolution in Coventry. London: Clarendon Press: Oxford University Press, 1960. 9". Pp. xi + 152. 21*s*.

[To be reviewed.]

Proceedings of the Tenth International Conference of Agricultural Economists. London: Oxford University Press, 1960. 9½". Pp. xii + 535. 42*s*.

[Here is a valuable addition to our knowledge of the theory and problems of agriculture, especially in underdeveloped countries. The general subject of the Conference, held in Mysore in 1958, was "Agriculture and its Terms of Trade." Twenty-three papers were read and debated by distinguished contributors from many countries. Among the topics discussed were the factors that determine the terms of trade for agricultural products, the agrarian experience of developed and underdeveloped countries, the role of education, research and extension services, measures of agricultural support, rural population movements, planning procedures in India, Israel, Japan and Russia and the place of international organisations.]

PUTHUCHEARY (J. J.). Ownership and Control in the Malayan Economy. London: University of London Press, 1960. 7½". Pp. xxii + 187. 14*s*. 3*d*.

[This book is unusual in having been written in prison, where the author has been a political detainee. Part I analyses the structure of ownership and control in the rubber industry, in commerce, in mining and in Singapore's secondary industries. This factual survey contains much interesting material. The author's thesis is that a large part of the Malayan economy is controlled by large-scale units, of which the agency houses and the mining agencies are the most important. He also strongly disputes the commonly held view that the Chinese dominate the economy, though he admits that their importance is growing. Part II of the book considers the problems of the supply of capital for development in the light of the conclusions reached in Part I. The author argues that the supply of capital for secondary industry has been impeded by the dominance of foreign capital, since this has meant that profits, the natural source of finance, have tended to be taken out of the country if they could not be put to use in the business where they were earned, instead of the profit-earners looking round for other local investment outlets.]

RICHARDSON (G. B.). Information and Investment. London: Oxford University Press, 1960. 7½". Pp. 226. 21*s*.

[To be reviewed.]

RIMMER (W. G.). Marshall's of Leeds, Flax-Spinners 1788–1886. London: Cambridge University Press, 1960. 8½". Pp. xiii + 342. 42*s*.

[To be reviewed.]

ROBERTSON (SIR DENNIS) and DENNISON (S. R.). The Control of Industry. Welwyn: Nisbet (London: Cambridge University Press), 1960. 7½". Pp. xiv + 162. 10*s.* 6*d.*

[To be reviewed.]

ROBINSON (J.). Exercises in Economic Analysis. London: Macmillan, 1960. 7½". Pp. xx + 242. 6*s.* (paper-bound) and 16*s.* (cloth-bound).

[To be reviewed.]

SCHLESINGER (J. R.). The Political Economy of National Security. London: Stevens, 1960. 8½". Pp. 292. 35*s.*

[This book is based on a series of lectures given to American naval officers. It is designed to serve as a general primer of the economic aspects of the cold war. The author dissents from a number of views now prevalent in American discussions of defence. He believes that a country's economic capacity is much less important in determining the course of the power struggle than is generally supposed. He also thinks that the political gain from American aid to under-developed countries is limited, and that such aid as is given should be concentrated on pro-Western countries rather than on uncommitted ones. The case that the author makes for this and other similar unpleasing conclusions is a forcible one, if his underlying assumptions are granted.]

SCHONFIELD (A.). An Attack on World Poverty. London: Chatto & Windus, 1960. 9½". Pp. x + 244. 21*s.*

[To be reviewed.]

SCHUMPETER (E. B.). English Overseas Trade Statistics 1697–1808. London: Clarendon Press: Oxford University Press, 1960. 10" × 14". Pp. vii + 72. 45*s.*

[To be reviewed.]

SEN (A. K.). Choice of Techniques. Oxford: Basil Blackwell, 1960. 8½". Pp. 122. 18*s.*

[To be reviewed.]

SIMEY (T. S. and M. B.). Charles Booth, Social Scientist. London: Clarendon Press: Oxford University Press, 1960. 9". Pp. x + 282. 30*s.*

[To be reviewed.]

TURVEY (R.). Interest Rates and Asset Prices. London: Allen & Unwin, 1960. 8". Pp. 109. 12*s.*

[To be reviewed.]

WEBER (M.). The City. London: Heinemann, 1960. 8½". Pp. 242. 21*s.*

[To be reviewed.]

WILSON (R. E.). Two Hundred Precious Metal Years. A History of the Sheffield Smelting Company Limited 1760–1960. London: Ernest Benn, 1960. 9". Pp. xxii + 316. 63*s.*

[This is the history of a prominent business engaged in the treatment of gold, silver, platinum, other precious metals and non-ferrous metals. The author is a director of the business and a direct descendent of the founder in the sixth generation.]

WILSON (T.). Inflation. Oxford: Basil Blackwell, 1961. 9". Pp. 280. 30*s.*

[To be reviewed.]

Australian

The Australian National Income and its Distribution. Sydney: Australian Council of Salaried and Professional Associations, 1959. 8½". Pp. 177.

[This contains the proceedings of a conference organised by bodies concerned with the interests of salaried workers. The main subject under discussion was the relative deterioration in the economic position of white-collar workers. The statistics bearing on this were considered, and alternative ways of checking and reversing the trend were proposed and discussed.]

Canadian

INMAN (M. K.). Economics in a Canadian Setting. Toronto: Copp Clark, 1959. 9¼″. Pp. x + 771. $6.95.

[To be reviewed.]

New Zealand

RESERVE BANK OF NEW ZEALAND. Overseas Trade and Finance. Wellington, New Zealand: The Reserve Bank of New Zealand, 1960. 8¼″. Pp. 252. 15*s*.

[The material in this book has mostly appeared as articles in the Reserve Bank's *Bulletin*. It provides a good summary description of the organisation of international payments, the course of recent developments in world balances of payments, the theoretical background and the problems to be faced in the future. The subject is looked at from New Zealand's point of view.]

Indian

AGARWALA (S. N.). (Ed.) India's Population. Some Problems in Perspective and Planning. Bombay and London: Asia Publishing House, 1961. 9″. Pp. xl + 208. 38*s*.

[This volume contains the papers read by fourteen scholars at a seminar in the Institute of Economic Growth, Delhi. The four main topics were the future growth of India's population, employment aspects, policy and problems of demographic research. A growth rate of 2% per annum is envisaged for the next decade or so, but there was little agreement on the longer-term course of death- and birth-rates. Among the major problems stressed are the enormity of the task of providing employment for the growing work force, the importance and difficulty of teaching villagers, the advantages of smaller families and the need for greater facilities for research on Indian demography.]

MATHUR (J. S.). Essays on Gandhian Economics. Allahabad: Chaitanya Publishing House, 1960. 8¼″. Pp. v + 86. Rs. 3.

[The author of this small pamphlet fears that the educated classes in India are in danger of forgetting the philosophy and precepts of Gandhi in their quest for material advance. He provides here seven interesting, short essays, most of them previously published elsewhere, on subjects including the Gandhian view on industry, class, wages, technology and trade unions. Useful for those who find the mystique about Gandhi mystifying.]

MEHTA (J. K.). Lectures on Modern Economic Theory. Allahabad: Chaitanya Publishing House (5a University Rd., Allahabad 2), 1960. 9″. Pp. xxii + 221. 20*s*.

[This book consists of a survey in a series of separate lectures of most of the traditional topics of economic theory: utility, price-determination, interest theory, the multiplier, the trade cycle and so on, with brief lectures at the end on input–output and econometrics. The treatment is at the intermediate level of difficulty. The author shows good acquaintance with the literature, and some of his own ideas are of interest.]

NATIONAL COUNCIL OF APPLIED ECONOMIC RESEARCH. Appraisal of Steel Demand. New Delhi: Council of Scientific and Industrial Research, 1960. 9¼″. Pp. xi + 138. Rs. 10 or 16*s*.

[The Council is publishing much useful and competent work on the Indian economy. The demand for steel is particularly interesting, because of the many criticisms that too much emphasis is being placed by the planners on heavy industry, especially steel, and because of doubts about the country's capacity to absorb the available output of the plants newly constructed. This book attempts a quantitative estimate of future demand for steel by analysing its likely requirements in various end-uses, ranging from the railways, the most important single consumer, to agriculture. The conclusion reached is that, during the course of the third and fourth plans at least, demand is unlikely to lag behind supply. The estimates, of course, depend on many assumptions about Government policy, population and income growth and the cost and price of steel which, the authors realise, may not be substantiated.]

NATIONAL COUNCIL OF APPLIED ECONOMIC RESEARCH. Demand for Energy in India, 1960–75. Bombay: Asia Publishing House, 1960. 9½". Pp. xiii + 161. 19*s*.

[As in the case of steel mentioned in the preceding note, the projections here rest on certain assumptions. Given these, the authors provide figures of the probable demand for different types of energy in different uses over the next fifteen years. They envisage a rapid increase in energy consumption, that the Indian economy will still be coal-based in 1975 but that the share of coal in total energy consumption will fall relative to that of other fuels and hydro-electric power. The difficulties of trying to quantify the future trend of energy demand have been amply demonstrated in Britain in the last decade, and it would be rash to believe that the Indian prophets will be more successful. But it is perhaps better to have estimates that turn out wrong than no estimates at all.]

NATIONAL COUNCIL OF APPLIED ECONOMIC RESEARCH. Techno-Economic Survey of Madhya Pradesh. Bombay: Asia Publishing House, 1960. 10½". Pp. xviii + 323. 50*s*.

[Madhya Pradesh State was created in 1956, is one of the poorest and most underdeveloped in India and has a population of 26 millions, thinly settled and many of them "tribal." The soil is poor, agricultural productivity and general incomes below the national average, and large-scale industry, excepting the steel-works at Bhilai, rare. The region, however, is well forested and rich in comparatively unexploited mineral wealth. This work gives a useful quantitative survey of the State's economy and resources. The authors also discuss the prospects for development and make many positive recommendations. The resources to finance the public investment which their proposals entail are going to be difficult to find, especially if their explicit aim of fostering private savings and enterprise is to be realised.]

SEN (S. N.). The City of Calcutta. A Sociological Economic Survey 1954–55 to 1957–58. Calcutta: Bookland Private Ltd., 1960. 10". Pp. ii + 269. Rs. 30.

[Socio-economic surveys of Indian cities have become very fashionable in recent years. Although much of the data collected must be unreliable, they provide a great deal of useful information, and this volume is no exception. The author here gives statistics on, *inter alia*, housing population, migration, earnings, occupations and cinema-going. The figures substantiate many of the well-known generalisations about population growth, primitive sanitation, the small proportion of factory workers in the work force and the low average level of real earnings. They bring home the enormity of the task facing those who plan the future of India's second largest city.]

SINHA (S. L. N.). The Capital Market of India. Bombay: Vora & Co., 1960. 9". Pp. xi + 300. 30*s*.

[This is a useful, factual descriptive survey which provides information on the new-issue market, managing agents, commercial banks, stock exchanges, specialist finance corporations, rural credit and so on. The author concludes that the financial institutions which now exist for mobilising and channelling private savings into industry are satisfactory. But in the rural sector credit remains scarce and dear, the hoarding of bullion is widespread, the money-lender is the main source of funds and the record of the co-operatives is disappointing.]

SINGH (V. B.) and SARAN (A. K.). Industrial Labour in India. Bombay and London: Asia Publishing House, 1960. 9". Pp. xv + 528. 48*s*. 6*d*.

[The aim of this book is to provide a comprehensive survey of labour economics. It assembles twenty-five essays on wage theories, social security, wage payments, industrial relations and industrial sociology. The contributors are mainly Indian economists, but there are also essays by M. H. Dobb, K. Alexander, C. W. Guillebaud and Franz Adler. Although much of the information is available elsewhere and some of its not directly relevant to India, the general standard of the essays is high, and students will find useful material on Indian labour problems ranging from the course of real wages from 1939 to 1950 to the recent evolution of the trade-union movement.]

Pakistani

FELDMAN (H.). Karachi through a hundred years. Karachi: Pakistan Branch, Oxford University Press, 1960. 9½". Pp. xvi + 258.

[Chamber of Commerce records are a fruitful source of material to the economic historian. This centenary history of the Karachi Chamber was based largely on its records. It provides a great deal of useful information on the development of the port and of Sind and, particularly, on the British companies operating there. The serious scholar will find the lack of documentation irritating.]

American

BAERWALD (F.). Economic System Analysis. Concepts and perspectives. New York: Fordham University Press, 1960. 9″. Pp. x + 113. $3.00.

[In spite of its somewhat grandiose title, this volume turns out to be a short treatise on balanced growth, with particular reference to the American economy. After setting out the problem in broad terms, the author goes on to consider the different sectors of the economy individually, and concludes with a discussion of price stability. While the author is to be commended for his insistence that macro-economic analysis needs to be considered in the context of a growing economy, the book is not without serious technical shortcomings and, in particular, the treatment of price changes is unsatisfactory. There is no index.]

BIERMAN Jr. (H.) and SMIDT (S.). The Capital Budgeting Decision. New York and London: Macmillan, 1960. 8″. Pp. xi + 246. 42*s*.

[The purpose of this book is to state in a form useful for business-men the criteria that have been evolved in recent economic literature for assessing the profitability of investment projects. Methods of calculating net return are presented extremely clearly, and a strong case is made for preferring the present-value method, in which the stream of expected returns and outlays are discounted at an externally given rate of interest, to the marginal efficiency of investment method. The discussion of the replacement problem is especially good. The treatment of the cost of finance is less thorough, and is open to question at some points. In particular, the authors do not really make a convincing case for their procedure of reckoning the cost of finance raised by new issues on the basis of expected dividend yield rather than on the basis of expected earnings yield.]

BLACK (E. R.). The Diplomacy of Economic Development. Cambridge, Mass.: Harvard University Press (London: Oxford University Press), 1960. 8¼″. Pp. x + 74. 24*s*.

[In these three lectures Mr. Black argues that "development diplomacy"—policy regarding assistance to underdeveloped countries—must be accorded a recognised status as part of national policy in Western countries. His survey of the forms which this diplomacy should take and of the background against which it has to operate is humane and enlightened without being particularly novel.]

BRANDIS (R.). Economics: Principles and Policy. Homewood, Illinois: Irwin, 1959. 9″. Pp. xvii + 340. $6.00.

[To be reviewed.]

BRODY (D.). Steelworkers in America. Cambridge, Mass.: Harvard University Press (London: Oxford University Press), 1960. 8″. Pp. viii + 303. 40*s*.

[This is a history of industrial relations in the American steel industry from the 1890s to 1929. The author's approach is an admirably analytical one. He attributes the hard labour conditions at the beginning of the period to the intensity of competition in the industry. When competition between producers was replaced by co-operation in the Morgan era, the Steel Corporation started to apply similar principles to its relationship with labour and to concern itself with the welfare of its employees. The author explains the absence of effective unionism in most of this period by the undermining of the skilled workers' position by mechanisation, by the free supply of immigrant labour and by the antagonism between the unskilled immigrants and the skilled English-speaking workers. Only under the special conditions of the First World War was the non-union system temporarily threatened.]

CHEN (K-I.). World Population Growth and Living Standards. New York: Bookman, 1960. 9″. Pp. 93. $4.00.

[This brings together data on world population trends from prehistoric times up to the present day. It also presents a statement in elementary terms of the threat to living standards which the growth of population involves.]

COPELAND (M. A.). Fact and Theory in Economics: The Testament of an Institutionalist. Collected papers edited by C. MORSE. Ithaca, New York: Cornell University Press, 1958 (London: Oxford University Press, 1959). 9″. Pp. xviii + 347. 48*s*.

[To be reviewed.]

CROSSER (P. K.). State Capitalism in the Economy of the United States. New York: Bookman Associates (31 Union Square West, New York 3, New York), 1960. 8½". Pp. 158. $4.00.

[The author puts forward the thesis that the substantial assistance given by the United States government to agriculture and to business, through military spending with generous profit margins, and other channels, is now necessary to the working of the capitalist system, and so changes its nature as to require it to be redesignated state capitalism. He also emphasises the use made by private business and labour interests of the power of the state. In a concluding chapter he takes a qualifiedly optimistic view about the tendency to authoritarianism that might seem to be involved.]

ERLICH (A.). The Soviet Industrialization Debate, 1924–1928. Cambridge, Mass.: Harvard University Press, Russian Research Center Studies 41, 1961. 8½". Pp. xxiii + 214. 48*s*.

[To be reviewed.]

FIRESTONE (J. M.). Federal Receipts and Expenditure During Business Cycles, 1879–1958. Princeton, New Jersey: Princeton University Press for the National Bureau of Economic Research (London: Oxford University Press), 1960. 9". Pp. xvi + 176. 32*s*.

[The cyclical movements of federal receipts and expenditures, and hence of deficits and surpluses, are here traced out by means of the techniques of cycle analysis developed by Burns and Mitchell. Expenditures show no clear cyclical patterns. Receipts, as expected, rise and fall with the cycle. This pattern persisted for the whole of the period studied, but cyclical fluctuations in receipts have been much more pronounced since the First World War. This is because income tax, which is a progressive tax and therefore very sensitive to changes in national income, has replaced customs duties as the main source of federal revenues. The conclusion is therefore drawn that although the federal budget has always served as a built-in stabiliser, it has been a more effective one in recent times than it was formerly.]

FREEMAN (R. E.). Postwar Economic Trends. New York: Harper & Brothers, 1960. 8½". Pp. viii + 384. $6.00.

[To be reviewed.]

GAMBS (J. S.) and WERTIMER (S.). Economics and Man. Homewood, Illinois: Irwin, 1959. 9". Pp. xiii + 353. $6.00.

[To be reviewed.]

GROSSMAN (G.) (Ed.). Value and Plan. Berkeley and Los Angeles: California University Press (London: Cambridge University Press), 1960. 9½". Pp. vii + 370. 56*s*.

[To be reviewed.]

HALL (D.). Free Jamaica, 1838–1865. An economic history. New Haven, Connecticut: Yale University Press, 1959 (London: Oxford University Press, 1960). 9". Pp. xii + 290. 40*s*.

[This is an economic history of Jamaica in the quarter-century after the emancipation of the slaves. The main themes are the growth of a class of small agriculturists and the labour troubles of the plantations. The book is based on a London Ph.D. thesis.]

HOROWITZ (M. A.). Manpower Utilization in the Railroad Industry. An Analysis of Working Rules and Practices. Boston, Mass.: Bureau of Business and Economic Research, Northeastern University, Boston, Mass., 1960. 9". Pp. viii + 68.

[This analyses in detail the history and present significance of various make-work and featherbedding practices in the American railroad industry. The author argues that, although the wastage resulting from some of these practices is obvious and substantial, no simple solution is to be had by just abolishing the rules, since they require to be looked at in conjunction with the whole structure of wages. The long-term decline in employment in the industry is the background of the problem.]

HOSELITZ (B. F.). Sociological Aspects of Economic Growth. Chicago, Illinois: Free Press of Glencoe, Illinois (119 West Lake St., Chicago 1, Illinois), 1960. 8½". Pp. 250. $5.00.

[To be reviewed.]

HULTGREN (T.). Changes in Labor Cost during Cycles in Production and Business. National Bureau of Economic Research, Occasional Paper 74. New York: National Bureau of Economic Research, 1960. 9". Pp. xvii + 85. $1.50.

[This monograph uses the traditional National Bureau technique of cycle analysis to arrive at some interesting findings. Within the "specific" cycles of production of individual commodities, output per man-hour rises and falls with output, the pattern being most pronounced at the beginnings of upswings and of downswings. Hourly earnings generally rise throughout the cycle. The net result is that labour costs fall in expansion phases, or at least in their earlier parts, and rise in contraction phases. But when expansion and contraction are defined in terms of the general level of activity, instead of in terms of production of the commodity concerned, the result is reversed: costs rise and fall with activity. The explanation for this divergence seems to be, broadly speaking, that economies of scale are a function of the output of the individual commodity, while hourly earnings are a function of the general level of activity.]

KAHN (C. H.). Personal Deductions in the Federal Income Tax. National Bureau of Economic Research. Princeton, New Jersey: Princeton University Press (London: Oxford University Press), 1960. 9". Pp. xxix + 237. 40s.

[Deductions permissible under federal income-tax law include philanthropic contributions, certain tax payments, personal interest payments, medical expenses and casualty losses, and the standard deduction which a tax-payer may opt for instead of itemising his deductions under the other heads. The author discusses the history of each of these deductions, their rationale, their quantitative importance and their effects. He also analyses the effect of the system of deductions as a whole on the size of the tax base, on the effective rate of taxation of different income groups and on the degree of built-in flexibility provided by the income tax. This is a careful and competent piece of work and a useful addition to the literature of the subject.]

KENEN (P. B.). British Monetary Policy and the Balance of Payments 1951–1957. Cambridge, Mass.: Harvard University Press (London: Oxford University Press), 1960. 8¼". Pp. xiv + 325. 60s.

[To be reviewed.]

KIMBLE (G. H.). Tropical Africa. Vol. 1, Land and Livelihood. Vol. 2, Society and Polity. New York: The Twentieth Century Fund (41 East 70 Street, New York 21), 1960. 9½". Pp. 603 and 506. $15 the set.

[To be reviewed.]

KUHLMAN (J. M.) and SKINNER (G. S.). The Economic System. Homewood, Illinois: Irwin, 1959. 9½". Pp. xiii + 509. $6.50.

[To be reviewed.]

LICHTENBERG (R. M.). One Tenth of a Nation. National Forces in the Economic Growth of the New York Region. Cambridge, Mass.: Harvard University Press (London: Oxford University Press), 1960. 8". Pp. xvi + 326. 54s.

[This provides an analysis of employment in the New York region, compared with the United States as a whole, together with projections for 1985. It is estimated that employment will grow at about the same rate in New York and in the rest of the United States, as a result of the offsetting influences of the above-average growth rate of employment in the industries in which New York specialises and of the weakening of New York's competitive position within most industries. This conclusion is based on careful analysis of the present employment structure and of trends in costs. Some of the most interesting findings relate to the structure of manufacturing industry in New York. An unusually high proportion of manufacturing employment is in industries in which New York produces a very high percentage of the total national output. These are typically industries producing unstandardised products, where the average size of the firm is small and external economies are a dominant influence on location.]

MILLICAN (R. D.). A Quadrifactor Theory of Consumption Expenditures. Champaign, Illinois: Illini Union Bookstore, 1960. 11". Pp. iii + 63.

[To be reviewed.]

NATIONAL BUREAU OF ECONOMIC RESEARCH. The Quality and Economic Significance of Anticipations Data. Princeton, New Jersey: Princeton University Press (London: Oxford University Press), 1960. 9". Pp. xi + 466. 72s.

[To be reviewed.]

NATIONAL PLANNING ASSOCIATION. Local Impact of Foreign Trade. A Study in Methods of Local Economic Accounting. Washington D.C.: National Planning Association (1606 New Hampshire Ave., N.W., Washington 9, D.C.), 1960. 9". Pp. xviii + 213. $7.00.

[This study uses input–output analysis to measure the impact of foreign trade on three American counties. It is based on systems of local accounts, constructed on the basis of estimates of local sales and purchases. Its interest is partly in the substantial conclusions reached and partly in the methods used. The coefficients yielded by the local estimates differ considerably from those in the standard 1947 inter-industry accounts for the country as a whole, and one of the main methodological questions is whether these differences represent real differences in productive techniques, or whether they are due mainly to differences in product-mix within individual industry classifications.]

SCOVILLE (W. C.). The Persecution of Huguenots and French Economic Development 1680–1720. Berkeley and Los Angeles, California: California University Press (London, Cambridge University Press), 1960. 9½". Pp. x + 497. 52*s*.

[To be reviewed.]

SHEARER (J. C.). High-Level Manpower in Overseas Subsidiaries. Experience in Brazil and Mexico. Princeton, New Jersey: Industrial Relations Section, Princeton University, 1960 8½". Pp. xiii + 161. $3.00.

[The main subject of this interesting study is the choice between the employment of Americans and of local nationals in executive positions in American overseas subsidiaries. It is based on field-work undertaken by the author in Mexico and Brazil. Mr. Shearer's conclusions are clear. It is far more expensive to employ Americans, and their superiority in quality does not justify the expense. In many cases they are actually inferior in quality, because of the difficulty of persuading the ablest Americans to serve abroad. The reason why large numbers of Americans continue none the less to be employed is the existence of a vicious circle: Americans are customarily assigned abroad on a career basis, and if they do come back it is difficult to find suitable posts for them because they have got out of touch. As a result American managers in overseas subsidiaries practise "job protection," and do not make genuine efforts to train up local nationals. In support of his hypothesis the author points out that nationals are more extensively employed in Brazil than in Mexico, the reason being that Americans tend not to like living in Brazil and press for repatriation, whereas those in Mexico do like it, and therefore resist measures that might lead to their own replacement. Mr. Shearer believes that the best policy for firms is to aim at 100% employment of nationals from the start.]

SMITH (R. S.). Mill on the Dan. Durham, North Carolina: Duke University Press (London: Cambridge University Press), 1960. 9½". Pp. xi + 570. 100*s*.

[This is the history of a leading textile company in Virginia. The author, who is Professor of Economics at Duke University, has done a skilful professional job in making an orderly and interesting narrative out of the vast mass of the company's records.]

TRONCOSO (M. P.) and BURNETT (B. G.). The Rise of the Latin American Labor Movement. New York: Bookman Associates (31 Union Square West, New York 3, New York), 1960. 8½". Pp. 179. $5.00.

[This narrates in outline the development of trade unionism in Latin America country by country and describes the present position. Particular attention is given to the relation between the labour movement and politics.]

UHR (C. G.). Economic Doctrines of Knut Wicksell. Berkeley and Los Angeles, California: California University Press (London, Cambridge University Press), 1960. 9½". Pp. xv + 356. 60*s*.

[To be reviewed.]

WARNER (D. F.). The Idea of Continental Union. Agitation for the annexation of Canada to the United States, 1849–1893. Lexington, Kentucky: University of Kentucky Press for the Mississippi Valley Historical Association, 1960. 9½". Pp. ix + 276. $5.00.

[This monograph analyses the recurring agitations that took place during the second half of the nineteenth century for United States annexation of Canada by agreement. On the Canadian side the agitation was mainly economic in origin, and the three periods when the movement was most active were all periods of depression, when the United States appeared more prosperous than Canada. In these periods the idea of annexation naturally appeared less attractive in the United States, and this conflict of interests is part of the explanation for the failure of the movement. In any case, however, the movement never gained majority support in Canada. But the existence in

the background of the possibility of unification with the United States had an important effect on the status of Canada within the Empire and on the status of individual provinces within Canada. Mr Warner's clearly written and interesting monograph was awarded a prize by the Mississippi Historical Association in 1959.]

WILCOX (C.). Public Policies Toward Business. Revised edition. Homewood, Illinois: Irwin, 1960. 9½". Pp. xiv + 907. $8.00.

[To be reviewed.]

Italian

HOLBIK (K.). Italy in International Cooperation. The achievements of her liberal economic policies. Padau: CEDAM, 1960. 10". Pp. xv + 153. Lire 2000.

[The main part of this book is taken up with a narrative account of Italy's foreign trade and foreign-trade policy in the years 1946–56. The author draws conclusions from the experience of those years about the possibilities and limitations of a fully liberal foreign economic policy for Italy and about Italy's prospects in the Common Market.]

Lebanese

MILLS (A. E.). Private Enterprise in Lebanon. Beirut: The American University of Beirut, 1959. 8". Pp. viii + 154.

[This is based on an M.Sc. thesis presented to the University of London in 1958. After a useful general survey of the background of the Lebanese economy, the author sets out to assess the performance of management and the impact of state policy. Many of the most serious weaknesses of management are shown to be the result of traditions and social attitudes which can only be changed gradually. The author attaches importance to the role of the universities in bringing about these needful changes of attitude.]

Swedish

CAIRNCROSS (A. K.). Monetary Policy in a Mixed Economy. Wicksell Lectures 1960. Stockholm: Almqvist & Wiksell, 1960. 9½". Pp. 50.

[Professor Cairncross takes the opportunity of these lectures to reiterate and develop some of the themes of the Radcliffe Report. The lectures are concerned more with practical policy questions than with the theory underlying the Report. They make clear that the controversies provoked by the Report have not led him to alter his views on the main issues. As one would expect, what he has to say is lively and stimulating. One of the most interesting passages concerns the official doctrine that it is impossible to fund on a falling market; Professor Cairncross shows clearly how grave an impediment this doctrine must be to effective monetary policy, if carried to extremes, but he sympathises with the point that the authorities have in mind. On the so-called "Roosa" effect, Professor Cairncross departs somewhat from the views put forward by the Radcliffe Committee. He now believes that the most significant effect of changes in interest rates on willingness to lend may come through the additional uncertainty they create, rather than by virtue of the new level as such.]

Norwegian

GINI (C.). The Location of Vinland. Bergen, Norway: The Institute of Economics, The Norwegian School of Economics and Business Administration, 1960. 12". Pp. 115.

[This lecture and long postscript is concerned with the location of Vinland, the land said in the Sagas to have been on the shore of Lake Ontario. An enormous volume of evidence is sifted in presenting the case. Professor Gini has been working on the subject for a long time, and the preparation of the monograph has evidently been a labour of love.]

PAULSON (E. W.). Transport and Communication Problems in Norway. Bergen, Norway: The Institute of Economics, The Norwegian School of Economics and Business Administration, 1958. 12". Pp. 10.

[A brief discussion of the present position and of the best way of carrying out and financing improvements.]

SVENDSEN (A. S.). The Revival of the Freight Market: 1962–1965? Bergen, Norway: The Institute of Economics, The Norwegian School of Economics and Business Administration, 1959. 12″. Pp. 9.

[On the basis of estimation of trends in the volume of trade and in tonnage available, the author estimates that the tanker market may recover by 1963–64 and the dry cargo market a year or so earlier.]

Official

BRITISH

COLONIAL OFFICE. Colonial Research, 1959–1960. London: Her Majesty's Stationery Office, 1960. 9½″. Pp. 381. 17*s*.

[This contains eleven separate reports from specialised committees and other agencies. Most of these reports are of a technical nature, the longest being that of the Committee for Colonial Agricultural, Animal Health and Forestry Research. The report of the Colonial Economic Research Committee describes briefly the work it has recently sponsored.]

NIGERIAN

THE FEDERAL MINISTRY OF COMMERCE AND INDUSTRY, LAGOS. Handbook of Commerce and Industry in Nigeria. Lagos: The Federal Ministry of Commerce and Industry, 1960. 9¼″. Pp. xiii + 337. 15*s*.

[This is the fourth edition of a handbook designed for the use of business-men trading in Nigeria. A brief general survey is given of the economy of the country, and this is followed by full particulars of laws and regulations affecting the trader, and the institutional framework within which he is required to work.]

AMERICAN

U.S. DEPARTMENT OF HEALTH, EDUCATION AND WELFARE. Basic Readings in Social Security. Washington, D.C.: Social Security Administration, 1960. 9″. Pp. vi + 221. $1.

[This is a bibliography containing some 1,640 references concerned with social security in the United States. It has been prepared primarily for the use of those employed in the administration of social-security programmes.]

PUERTO RICAN

BHATIA (M. S.). Redistribution of Income through the Fiscal System of Puerto Rico. Puerto Rico: Commonwealth of Puerto Rico, Office of the Governor, Puerto Rico Planning Board, Bureau of Economics and Statistics, 1960. 8″. Pp. 49.

[The redistributive effects of taxation and of government spending are calculated and shown in the form of Lorenz curves. The author's discussion of the conceptual difficulties involved in this type of calculation has some general interest.]

INTERNATIONAL

BANK FOR INTERNATIONAL SETTLEMENTS. Thirtieth Annual Report, 1959–60. Basle: Bank for International Settlements, 1960. 11¾″. Pp. 192.

[This report as usual provides an informative and well-arranged survey of the year's economic developments in Western Europe and North America, with special emphasis on the monetary side and on the balance of payments.]

G.A.T.T. International Trade 1959. Geneva: The Contracting Parties to the General Agreement on Tariffs and Trade, 1960. 9¼″. Pp. 189. $2.00.

[In addition to a survey of developments in the structure and pattern of international trade in 1959, this report contains an analysis of trade between industrial and non-industrial countries over the period 1953–58.]

INSTITUTE FOR INTERNATIONAL ORDER. Current Thought on Peace and War. Vol. 1, No. 1. New York: Institute for International Order (11 West 42nd St., New York 36, N.Y.), 1960.

[This is the first issue of a new quarterly digest of published materials and research in progress concerned with the problems of world order and conflict.]

INTERNATIONAL MONETARY FUND. Annual Report of the Executive Directors for the year ended April 30, 1960. Washington, D.C.: International Monetary Fund, 1960. 9″. Pp. 221.

[This year's report follows the usual lines, both in coverage and in point of view. The topics surveyed include international balances of payments during the year, exchange practices and payments arrangements, external payments and domestic financial developments (with particular stress on monetary policy) in selected countries, and the gold market. Much detailed information is given on all these topics. The assessment provided of the year's developments as a whole concludes with the words " a firm monetary basis has thus been provided for the adoption of liberal and nondiscriminatory commercial policy."]

UNITED NATIONS. Patterns of Industrial Growth, 1938–1958. New York: United Nations, 1960. 11¼″. Pp. 471. 60*s.* 6*d.*

[This large volume consists mainly of statistical tables, first in comparative form, then country by country. The statistics deal mainly with industrial production and its rate of growth, in total and by categories, for the period 1938–58 as a whole and for sub-periods. Also included are data on numbers employed, the structure of industry, value added per worker and similar topics, making an enormous amount of material in all. There is no doubt that it will prove a valuable source-book, even thought it may be felt that certain of the many proportions and other such measures worked out are not very significant economically. An introductory essay surveys the main findings. These are not on the whole surprising, but it is useful, for example, to be shown the very strong correlation between countries' rates of growth of exports and of industrial production (p. 24) and also the absence of any clear correlation between the rates of increase of production and of prices (pp. 27–8). Another well-known point which is usefully underlined is the importance of the choice of base dates in international comparisons of growth rates. Thus the rate of growth of production in the Common Market countries was far greater than in North America in the decade 1948–58, but appreciably less than it over the whole period 1938–58.]

UNITED NATIONS ECONOMIC COMMISSION FOR ASIA AND THE FAR EAST. Programming Techniques for Economic Development. With Special Reference to Asia and the Far East. Bangkok: United Nations Economic Commission for Asia and the Far East, 1960. 9″. Pp. ix + 130. 7*s.*

[To be reviewed.]

UNITED NATIONS FOOD AND AGRICULTURE ORGANIZATION. Agricultural Machinery Workshops: Design, Equipment and Management. Rome: F.A.O., 1960. 9″. Pp. viii + 111. 5*s.*

[This is a technical handbook intended primarily for the use of engineers responsible for planning and implementing land development and agricultural mechanisation projects.]

UNITED NATIONS FOOD AND AGRICULTURE ORGANIZATION. An Enquiry into the Problems of Agricultural Price Stabilization and Support Policies. Rome: F.A.O., 1960. 9″. Pp. xi + 234. 12*s.* 6*d.*

[This contains two separate reports. The first one describes and classifies methods of agricultural price stabilisation and their consequences, and considers briefly the guiding principles involved. The two main conclusions reached are that stabilisation policies should aim to stabilise prices at their long-run equilibrium level, unless there is some specific reason to the contrary; and that if it *is* necessary to support farm incomes at above the level resulting from market forces, this should be done as far as possible by indirect means designed to raise agricultural efficiency. The second, briefer, report takes up where the first one left off and considers some of the issues of principle in more detail.]

UNITED NATIONS FOOD AND AGRICULTURE ORGANIZATION. Marketing Livestock. Rome: F.A.O., 1960. 9″. Pp. vii + 209. 5*s.*

[Like the other works in this series, this is a practical guide, and serves to bring together information likely to be helpful in the improvement of livestock and meat marketing.]

UNITED NATIONS FOOD AND AGRICULTURE ORGANIZATION. Radioactive Materials in Food and Agriculture. Rome: F.A.O., 1960. 9″. Pp. ix + 123. 7*s.* 6*d.*

[This report reviews present knowledge of the behaviour of radioactive substances in food and agricultural materials, and indicates possible improvements in surveys in this area. It also makes recommendations regarding future research.]

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